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## ORIGINAL ARTICLES.

### EARLY DIAGNOSIS AND EARLY NEPHRECTOMY FOR TUBERCULOSIS OF THE KIDNEY.<sup>1</sup>

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At the annual meeting of the Medical Society of the State of New York, January 29, 1896, I read, by the kind invitation of its president, a paper entitled "The Early Diagnosis of Tuberculosis of the Kidney."<sup>2</sup> My remarks were based on the cystoscopic examination of two male patients who evidently suffered from primary renal tuberculosis in its early stage. The examinations were made by me in 1892 and 1893, *i. e.*, at a time when we were not yet in possession of a useful instrument for catheterizing the ureters. The correctness of my diagnosis, to my regret, could not be demonstrated by producing the pathologic specimens. Both men refused to accept my advice to have nephrectomy performed at once.

By way of reviewing the principal facts laid down in the article mentioned, I would here state the following: It is only the chronic form of tuberculous inflammation that interests the surgeon. The other form, acute miliary tuberculosis, belongs to the domain of internal medicine. The chronic tuberculous inflammation of the kidney is always at first unilateral and descends from the one kidney into the bladder (infecting on its way the ureter), and involves in the beginning one side of the latter organ only. In many instances of commencing renal tuberculosis this one organ, the kidney, alone is attacked by the deleterious inroads of the *bacillus Kochii*, while the lungs, intestinal tract, bones and joints, are absolutely healthy. Considerable time always elapses before the prostate, with the rest of the genital system and the other kidney, become affected.

With reference to diagnosis, I maintained that it was absolutely necessary that the general practitioner should make or have made a very careful analysis of the urine, whenever, in a formerly healthy person, a painful and frequent micturition sets in suddenly, with or without intermittent renal colic, while a formerly

transparent urine becomes turbid by the admixture of mucus, pus, or even blood. In such cases one should not invariably think of the presence of a renal calculus, but also of the possible presence of primary renal tuberculosis. The analysis of the urine should include microscopic examination for tubercle bacilli.

If there be suspicion of tuberculous disease, a negative result should not be accepted as final, but the examination should be repeated a number of times. It has been a great help, according to my experience in such cases, to have the patient collect in one large bottle the urine discharged during twenty-four hours, and at the end of this time to shake up the sediment well and fill a six- or eight-ounce bottle with an average specimen. The analysis of this specimen forms the basis for conclusions with reference to the health or disease of one or both kidneys. If tubercle bacilli are found, the diagnosis of tuberculosis of the urinary system is settled; if they are not detected, microscopic specimens should be taken from that sediment which had formed in the entire amount of urine collected within twenty-four hours. Should the microscope fail, after repeated trials, to prove the presence of the bacilli, it will be well to inoculate a rabbit by injecting some of the sediment into his pleural or peritoneal cavity. The use of Koch's tuberculin, which, after injection makes tubercle bacilli appear in the urine of patients suffering from renal tuberculosis (Czerny), cannot be advised on account of the occasionally injurious effect of these injections. The best means, however, for clearing up a doubtful case, and the only one by means of which an exact diagnosis can be made with reference to the primarily affected part of the uropoietic system, is cystoscopy in combination with catheterization of the ureters.

In the article mentioned above I stated that if after repeated search tubercle bacilli were not found in the urine of a patient in whom the presence of tuberculous disease was suspected, the cystoscope would settle the diagnosis. I said: "On viewing the interior of the bladder, the cystoscopist perceives an absolutely healthy surface of the vesical mucous membrane and one perfectly normal ureteral opening. The mouth of the other ureter, however, is injected, and a number of circumscribed, clearly defined, inflamed areas of mucous membrane can be seen between it and the slightly hyperemic trigonum, leaving the interposed tissue unchanged in appearance; and thus one recog-

<sup>1</sup> Read before the Surgical Section of the New York Academy of Medicine.

<sup>2</sup> MEDICAL NEWS, March 7, 1896.

nizes with marvelous and astonishing clearness the enemy's steps in a hitherto uninvaded field. I could not compare this picture better than to liken it to foot-prints in the freshly fallen snow. No other disease of the bladder or kidney with which I am acquainted presents a similar cystoscopic appearance."

From this cystoscopic picture alone, I should venture to make the diagnosis of primary tuberculosis of one kidney, so much more, if intermittent, frequent, and painful micturition be the principal symptom. In a case of non-specific pyelitis or pyonephrosis the patient will pass his urine every four or six hours, even if one-third of the whole amount is pure pus. In cases of gonorrheal affections of the kidney, where the pathologic process has ascended, it naturally has passed the vesical viscus, and there first produced a gonorrheic catarrhal inflammation. If a patient with renal tumor be submitted to a cystoscopic examination early, say after the first attacks of hematuria, the bladder will be found normal throughout; that is to say, assuming that infection had not been previously carried into the bladder by catheterization with insufficiently disinfected instruments, which could have set up an artificial catarrh. Should this have occurred, the picture will be blurred. It cannot then be expected that cystoscopy can be performed with success and satisfaction. From this point of view we cannot too strongly insist upon the primary use of the cystoscope. Not in every case of primary renal tuberculosis that is subjected to an early cystoscopic examination, will the clear, unmistakable picture, as above described, be seen. Those clearly defined, circumscribed inflamed areas of the vesical mucous membrane between one ureteral opening and the internal urethral orifice, may be missed. Only the site of the mouth of one ureter may be inflamed and swollen; or, besides this phenomenon, and that in somewhat more advanced cases, a few disseminated, injected areas or superficial small ulcerations will be found in the fundus of the bladder behind the ureteral fold or on the lateral vesical wall corresponding to the affected side.

What I mean to emphasize here as an established fact is this: A rather recent, sudden, or slow appearance of painful or frequent micturition in a hitherto healthy subject who had not been infected with gonorrhea; concurrent with this, permanent, or more especially intermittent, voiding of a turbid urine with or without blood; on cystoscopic examination, a perfectly healthy bladder with only one ureteral opening clearly inflamed and swollen means "primary tuberculosis of the respective kidney." And this diagnosis can be made with propriety even when tubercle bacilli are not found. The cystoscopic diagnosis will be confirmed if circumscribed inflamed areas are seen

unilaterally in the bladder, either between the inflamed mouth of the respective ureter and the trigonum, or behind or to the side of the ureteral opening. It is, of course, possible that if a patient's bladder be inspected immediately after the first onset of the above-described renal symptoms, the secondary vesical symptoms have not yet had sufficient time to properly develop. Judging from what my experience has shown me, I should say that the secondary infection of the respective ureteral opening would appear very early in primary tuberculosis of the kidney, that is to say, within about four to six months. It is understood that nowadays catheterization of the ureters and separate drainage of the secretion of each kidney, with separate analysis of the urine collected in this way, is to be added to the cystoscopic examination in order to corroborate and still further define the result of the cystoscopic diagnosis.

I have mentioned above, that the surgeon must also exhaust all the means at his disposal to test for the presence of tubercle bacilli.

The following case which came under my care through the kindness of Dr. Elizabeth Cushier, Attending Physician to the New York Infirmary, will well illustrate the correctness of the statements just made:

Mrs. E. K., forty-six years of age, widow, married when twenty-five years old. Had had four children; no miscarriages. Youngest child two and a half years old. Two sisters died of phthisis. Husband was killed by an accident in the fall of 1894; had always been a strong, healthy man. Since his death the patient had worked hard to support her family. In August, 1895, her skull was fractured by a brick which fell from a building. She was treated at Bellevue Hospital for six weeks, but was not trephined. Up to that time she had not had urinary trouble or other symptoms of disease. She soon began to complain of frequent micturition, accompanied by lancinating, burning pain. From that time these symptoms continued to increase in severity, with intervals of comparative comfort, the pain being noticed before, during, and after the act of micturition. The latter was very frequent, hourly, half-hourly, and sometimes even every fifteen minutes. She also had pain in the pelvis, bearing-down sensations, backache, and nearly constant headache. She did not feel able to work, was weak, and did not sleep well. Appetite was fair, and bowels generally regular. The patient attributed most of the bladder symptoms to the fracture of the skull. She had consulted a physician in reference to the pelvic symptoms (she also suffered from leucorrhea), and he sent her to the New York Infirmary for observation and possible repair of a lacerated cervix. She was admitted to the Infirmary in April, 1896.

Examination showed great sensitiveness of the bladder to pressure through the vaginal wall; also, behind the cervix high up in the right vaginal fornix.



The cervix was lacerated, and the uterus rather large, but in a normal position. The urine, which was frequently examined, was generally found to be faintly acid or neutral, and slightly turbid. Specific gravity, 1014 to 1016. Odor normal. After filtration some albumin was found, but no sugar. The microscope demonstrated many pus cells, some of them broken down, and very few blood cells. There were no triple phosphates or casts. On one occasion the urine was quite clear and gave no reaction for albumin. Pulse 72 to 80; no rise of temperature (only twice it rose to 100.2° F.). Heart and lungs normal. Besides daily irrigation of the bladder with a normal salt-solution, the patient received some gynecologic treatment. There were several exacerbations of bladder pain and frequency of micturition, lasting several days. At such times the patient passed a small quantity of urine every half hour or hour, day and night, and complained of severe pain; between the exacerbations the pain was much less severe, but always present to some degree, and urination occurred seven or eight times a day. Amount of urine thirty to forty-five ounces daily.

Because of the continued presence of pus in the urine, the bladder symptoms, and the unabated sensitiveness to pressure on the bladder, especially at a point corresponding to the entrance of the right ureter, Dr. Cushier kindly sent the patient to me for a cystoscopic examination. On June 5th I performed the latter at my office, in the presence of Drs. Elizabeth Mercedes, Pathologist to the New York Infirmary, and Marian D. McDaniel, of the Infirmary staff. Contrary to my usual (routine) practice in these cases, namely, first, to make a careful general examination of the patient, and also a chemic, microscopic, and bacteriologic analysis of the urine, for several reasons, I introduced the cystoscope at once, without these previous examinations, and found the following most interesting condition: The entire bladder, the left ureteral fold, and the mouth of the left ureter were perfectly normal. The latter receded and protruded at intervals, and gave exit, as it appeared, to perfectly clear urine. The trigonum was very slightly injected. Corresponding to the mouth of the right ureter a uniformly purplish-red, somewhat elevated, spot of about the size of a ten-cent piece was seen. It presented an irregular surface, had a number of ecchymotic spots, and was covered here and there by white flakes of mucus. It did not move with the expulsion of urine. Its border line was rather ragged, but very distinct. The surrounding surface of the bladder was absolutely normal, not injected. No other spot of the interior surface of the bladder appeared to be diseased. The picture was striking, and, according to my cystoscopic experience, so characteristic of tuberculous disease that I at once asked the doctors present whether search for tubercle bacilli had been made in the specimens of urine. Receiving a negative reply, further examination was stopped for the time being.

In a subsequent search, Dr. Mercedes found the bacilli. Dr. Fred. E. Sondern also made an analysis of the urine, at my request, and reported the pres-

ence of a very small amount of blood, a moderate amount of pus and mucus, some hyalin and finely granular casts, numerous cells of the superficial and middle layers of the bladder (also intact aggregations of the same), some groups from the renal pelvis, and several groups of tubercle bacilli.

On June 18th the patient again came to my office, for catheterization of the ureters. Casper's instrument was used, and the left ureter was easily entered. The urine was perfectly clear, light amber in color, and 12 c.cm. was collected in ten minutes. The attempt to introduce the tiny catheter into the right ureter was difficult, but soon successful, in spite of the indistinct appearance of the orifice. It could be done only by carefully and repeatedly testing the inflamed area described above with the tip of the ureteral catheter. This caused a small hemorrhage. Suddenly the catheter slipped in, but it could be pushed forward a very short distance only. An impassable resistance was met with. There evidently was a stricture about three-fourths to one inch above the orifice. As further manipulations proved to be of no avail, and urine did not flow through the catheter, the instrument was removed and the bladder washed out and cocainized for a second time. A small blood clot was found in the eye of the catheter. A second and, later, a third attempt was made to complete the separate collection of the urine descending from the right kidney, but my efforts were unsuccessful, the stricture precluding success. Yet the work had not been done in vain. I had for examination and comparison the bladder urine and the specimen separately collected from the left kidney. If the latter proved healthy, the conclusion was absolute that the right kidney was the seat of the disease, and this on the simple reasoning that the bladder urine had shown evident symptoms of renal disease, and cystoscopy had proved the bladder, except the right ureteral orifice, to be in a healthy condition.

The specimen of urine collected from the left kidney was submitted to Dr. Sondern for examination. He reported that it showed absolutely nothing abnormal; that tubercle bacilli could not be found on repeated search; and he concluded that the left kidney was normal. Thus, the separate analysis of the specimens of urine fully corroborated the clinical diagnosis made at my first cystoscopic examination: primary tuberculosis of the right kidney, with secondary, still localized, involvement of the bladder. Nephrectomy was decided upon and performed, with the kind assistance of Drs. Gertrude B. Kelly and Eleanor B. Kilham, on June 30, 1896, at the Infirmary. The kidney was found to be comparatively large; it was situated rather low. The wound was partially closed by suture, partially packed with aseptic gauze. The pedicle was secured by an elastic ligature. The patient stood the operation very well, and her recovery was uneventful. The urine voided on July 1st, the day after the operation, was perfectly clear and light amber in color. It was faintly acid, and did not contain albumin or sugar. Micturition was almost painless, and less frequent by far than before the operation.

I owe thanks to Drs. Kelly and Kilham, and to the members of the house staff of the Infirmary. To their faithful after-treatment I feel that the patient's rapid and uneventful recovery is largely due.

The specimen obtained is of great interest.

**Macroscopic Examination.**—Kidney measures 11 x 7 x 6.5 centimeters. Surface slightly lobulated, as in fetal state. Scattered over the entire surface are tiny elevations from 2 to 5 mm. in diameter. Some of these are clear and translucent, evidently small cysts, while others are opaque and firm.

The capsule strips off readily, leaving these intact beneath.

A considerable portion of the hilus has been cut away, exposing an irregular cyst-like cavity about 2 cm. in diameter. The wall is thin and quite smooth on the inner side. The cavity extends to within nearly 2 mm. of the surface. (Beginning tuberculous pyonephrosis.)

Upon section through the cortex, the kidney is found healthier at its upper end. Here the pyramids are well marked; at the lower end not. Here and there, especially throughout the cortical layer, are seen the same opaque plugs as noted on surface. In the lower half of the parenchyma of the organ, near the cortex, is found an abscess cavity of about double the size of a pea. It is irregular, and filled with thin pus.

**Microscopic Examination.**—Section through cyst wall: The outermost layer is of connective tissue, poor in nuclei. Beneath this is a marked infiltration, with lymphoid cells, and also free blood in the tissue. Malpighian tufts show partial or complete hyaline degeneration. The inner edge is formed of degenerated tissue, but no tubercle tissue is seen anywhere.

Section from cortex: The small-celled infiltration is more general; changes in Malpighian tufts the same. But here we find large and small areas of the typical tubercle tissue. In places this is quite broken down, and corresponds to opaque points seen on the surface and through the cortex.

**Diagnosis.**—Diffuse tuberculosis of the kidney, with formation of cysts. Small areas of cheesy degeneration. (Report from Pathological Record of New York Infirmary. Signed, E. Mercedes, Pathologist.)

To-day the wound is firmly closed, and the patient has gained in weight, in spite of her daily hard work. She voids normal, healthy urine about every four or six hours during the day, without any trouble or pain, and during the night voids none at all.

As far as the influence of the removal of the diseased kidney upon the commencing vesical tuberculosis is concerned, it seemed to be not only of interest, but of importance (mainly with reference to clinical experience) to perform cystoscopy once more. It had to be decided, as far as one single case can show anything, whether early extirpation of a tuberculous kidney can cure a beginning bladder affection *per se*, that is, without any further local treatment; or, whether tuberculous, though localized,

infection of the bladder, having once occurred, will persist, although the continued reinfection from above had been rendered impossible; or, thirdly, whether, when the bladder has once been infected, the disease will spread and involve the entire organ.

Four months after the operation I, therefore, once more examined the patient's bladder at my office in the presence of Dr. McDaniel. I was astonished to see that the formerly inflamed area had entirely disappeared. The right ureteral opening was clearly visible, and the tissue surrounding it just the least bit injected. The vesical wall in its immediate neighborhood appeared normal. Thus the patient's cell energy had gotten rid of a beginning tuberculosis of the bladder, simply by the radical elimination of the continuously reinfecting primarily diseased focus. I believe this speaks for itself.

In perusing the literature on this subject, I have been able to find but one case where, by virtue of an early established definite diagnosis of primary tuberculosis of one kidney, nephrectomy was performed with the same effect and success as in the case here reported. It is the well-known case of L. Casper of Berlin, published in the *Berliner Klinische Wochenschrift* for April 27, 1896. It very much resembles that of my own. Briefly stated, it is as follows:

The patient, a woman aged forty-two, with negative family history, while suffering from a cold, was suddenly affected with frequent micturition and turbidity of urine. Soon intermittent pain in her right loin, together with an annoying sense of abdominal tension, was added to the other symptoms. Irrigation of the bladder only aggravated the trouble. Six months after the onset of the disease she came under Casper's care. Loss of weight up to that time amounted to six pounds. She urinated about every three hours in the day time and two or three times during the night. The urine was slightly turbid and of acid reaction. The specific gravity was 1018. It contained numerous pus cells, epithelial cells of the renal pelvis, and some albumin. There was no blood or casts. Bacteriologic examination revealed tubercle bacilli. Palpation of kidney and bladder negative. Upon cystoscopic examination the bladder appeared healthy throughout. The vessels of its mucosa were clearly defined. The left ureteral opening was normal. In the situation of the right ureter, whose opening could not be seen, was a diffusely injected, slightly elevated area. Clear urine spurled at intervals from the normally moving left ureteral mouth. The reddened spot at the usual site of the right one was immovable. Now and then a whirl of fluid emanated from it. The observer's eye was unable to distinguish any change in the translucidity of the latter. Two days later the ureters were catheterized. The left kidney discharged perfectly clear, normal urine. It was difficult to enter the right ureter. After a number of unsuccessful attempts the instrument suddenly slipped into the canal and was readily pushed forward. The urine thus obtained resembled the bladder urine, being turbid, slightly purulent, and albuminous. The amount of its albumin was in excess of that found in the bladder urine. Tubercle bacilli could not be demonstrated.



They were found, however, in another specimen which was drawn from the right kidney three days later. Diagnosis: Tuberculosis of the right kidney with circumscribed involvement of the bladder.

Some time later Professor Von Olshausen of Berlin performed nephrectomy. The surface of the kidney was covered with tuberculous nodules, and two cheesy foci were found in the parenchyma. The patient recovered. The urine rapidly cleared up and her pain disappeared.

By a peculiar coincidence, both patients, Casper's and my own, were female subjects. I wish to emphasize that this exact diagnosis could as well have been established if both had been males.

Meanwhile other authors have perhaps been similarly fortunate in making such an early definite diagnosis of this, in its ultimate course always deadly, disease. If so, I trust they will publish their interesting experiences. A multitude of similar successes must convert doubtful minds in the medical profession and make them draw this important conclusion: *In obscure urinary diseases always have an exact analysis made with the help of all modern means, and that as early as possible.* If this has been done beyond a doubt, do not let us avoid the logical consequence, *timely radical operation.*

Every one of us has seen over and over again tuberculosis of the urinary tract in its later stages. I need not describe its terrible symptoms. Surely the disease is much more frequent than the general practitioner seems to believe. Glancing over my records of this year, I find that I was able to definitely diagnose descending unilateral renal tuberculosis, with subsequent involvement of the bladder in a comparatively early stage, in five patients. Almost every one of these, however, had passed the border line where nephrectomy alone could have effected a permanent cure. In a number of them the additional total extirpation of the diseased ureter (a decidedly more serious operation than simple nephrectomy) would have been indicated. Perhaps a longer stay in a warm climate, with proper general regimen, local vesical treatment, etc., might also have so far improved one patient that we might later have been able to speak of a cure. But what an amount of sacrifice is required to save such a patient's life! How often will recovery be impossible because he cannot afford to carry out our orders; meanwhile, how often in the male subject will an ascending affection of the other kidney and the absolutely incurable involvement of the genital sphere have taken place.

Happy may we be, therefore, that the improved instruments at our command to-day have placed the means at our disposal to make an early exact diagnosis, on the basis of which we can do ideal surgical

work. Every case thus saved from a slowly wasting disease, dreadful in its duration, its tortures, and ultimate end, surely means a triumph of modern surgical diagnosis and therapy!

### THE CHEMISTRY OF GALL-STONES, WITH SPECIAL REFERENCE TO THEIR MODE OF ORIGIN.<sup>1</sup>

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THE biliary calculi, or concretions, which are so frequently formed in the gall-bladder, and in the intrahepatic bile-ducts, may be divided on the basis of their chemical composition into three main groups, *vis.*: (a) those which are composed in great part of cholesterolin; (b) those whose chief constituent is bile pigment, combined with calcium; and (c) those composed mainly of calcium carbonate and phosphate. In man, however, we have to deal chiefly with calculi containing a large predominance of cholesterolin, with some admixture of pigment and calcium, *i.e.*, the so-called mixed cholesterolin calculi; although occasionally nearly pure cholesterolin stones are found, and, on the other hand, nearly pure pigment-calcium calculi may occur. A so-called cholesterolin calculus, however, invariably contains some other material—at least in the nucleus—the largest proportion of cholesterolin ever found in a calculus being, I believe, 98.1 per cent., while the minimal amount in a true cholesterolin calculus is about 64 per cent. In the gall-stones of oxen cholesterolin is sometimes wholly absent, while as much as 45 per cent. of bilirubin may be present, *i.e.*, in a typical pigment-calcium calculus.

In most cases the nucleus of the gall-stone is composed of the insoluble combination of bilirubin, or a related bile pigment, with calcium or lime. Less commonly, the nucleus appears to consist of a crystalline mass of cholesterolin, with some mucus, while occasionally some foreign substance may serve as the center around which the concretion forms. According to Naunyn, the nucleus of many gall-stones is made up of spheres or warty masses of calcium carbonate.

It is thus evident that in considering the chemical composition of gall-stones we have to deal mainly with three classes of substances, *vis.*: cholesterolin or cholesterolins; bile-pigments, chiefly bilirubin, combined with calcium; and certain mineral salts, especially calcium carbonate and phosphate. Cholesterolin, bilirubin, and calcium salts are all normal constituents of human bile, and we may profitably consider for a moment some of their peculiarities as

<sup>1</sup> Read before the New York Academy of Medicine, April 15, 1897.

an aid to a better understanding of their presence in gall-stones.

Cholesterin, when pure, is a white crystallin substance, more or less waxy, lighter than water, readily soluble in warm alcohol, also in ether, chloroform, benzol, and other like solvents, but insoluble in water. Although it has many of the physical properties of a fat, it cannot be classed with the fats since it is non-saponifiable, and contains within its molecule neither fatty acid nor glyceryl radicles. In view of its peculiar solubility we may well inquire how it is that cholesterin exists dissolved in normal bile? As already stated, it is wholly insoluble in water, and also in aqueous solutions of neutral salts, but the salts of the bile acids—sodium glycocholate and taurocholate—exert a solvent action upon the substance, and it is in virtue of these constituents, aided perhaps by the soluble soaps and neutral fats, which are likewise present in bile, that the cholesterin is held in solution. The extent of this solvent action is indicated by some experiments made by Happel, who found that aqueous solutions of sodium glycocholate and taurocholate—0.2 to 2.5 per cent. in strength—are capable of holding in solution at the body temperature an amount of cholesterin equal to one-tenth the weight of the bile salt. Presumably, any concentration of the cholesterin beyond this point would be attended by its separation or crystallization.

The amount of cholesterin contained in human bile varies quite noticeably with the length of time the bile remains in the gall-bladder. Thus, as the recent analyses of Hammarsten<sup>1</sup> show, so-called "liver bile" flowing directly from the liver, contains 0.048 to 1.160 per cent. of cholesterin, while "bladder bile" may contain as much as 0.986 per cent. of the substance. This apparent increase in the content of cholesterin attendant upon the sojourn of the bile in the gall-bladder is not necessarily due, as might at first sight appear, to an outpouring or secretion of cholesterin from the mucous membrane of the bladder, but is the result of a general concentration of the bile attendant upon an absorption of water and of diffusible salts. This absorption of water with consequent concentration of the bile is not due, according to Hammarsten, to a simple process of diffusion, but is the result of a specific activity on the part of the epithelial cells of the mucous membrane by which water and soluble chlorids are removed. Hence, when from any cause bile is retained within the living gall-bladder for any great length of time, this process of absorption leads to a very great increase in the concentration of the fluid. Thus, while

human "liver bile" rarely contains more than 3.5 per cent. of solid matter, "bladder bile" may contain as much as seventeen per cent. of solids. That this increase in solid matter is due only in part to secretion of mucous material from the walls of the gall-bladder is evident from the proportion of bile salts in the two cases. Thus, while liver bile seldom contains over 1.8 per cent. of glycocholate and taurocholate, bladder bile may show nearly ten per cent. of these salts. It is thus manifest that the increased amount of cholesterin found in bile which has stood for some time in the bladder can be wholly explained on the ground of growing concentration, due mainly to the withdrawal of water. Now, in this connection it is to be remembered that stagnation of bile in the gall-bladder is generally considered as a primary condition in the formation of gall-stones, that anything which tends to hinder the flow of bile favors the formation of biliary calculi, and the above facts certainly lend favor to this view. The mere concentration of bile, however, with its consequent increase in the percentage of cholesterin, does not necessarily imply that a crystallization or separation of this substance will occur, although it does follow that the conditions are thereby made more favorable for such separation. Thus, if bile is concentrated outside of the body by heat, there is no noticeable separation of cholesterin, no formation of concretions of any kind, even though the fluid be allowed to stand until putrefaction is well under way. Evidently, certain other influences, aside from mere concentration, are needed to incite the formation of a calculus.

We may next inquire what is the primary origin of the cholesterin found in the bile? On this point there are two views. One is that the liver simply separates from the blood flowing through it the cholesterin contained in this fluid, passing it over to the bile; while the other view, held especially by Nannyn, is that the cholesterin is of local origin, being formed chiefly by changes taking place in the epithelial cells of the mucous membrane of the gall-bladder. Now it is a well-known fact that cholesterin is widely distributed throughout the body, that it is present in large amount in nerve tissue, and is apparently contained in all animal cells in small amount. This latter fact implies that it is a constant product of cellular activity, doubtless coming from the metabolism of the cell protoplasm. Further, it is constantly present in the blood, both in the blood-serum and in the corpuscles, existing there wholly, or in part, as a cholesterin-ester. Unquestionably, a certain amount of cholesterin is normally found in the liver, as a product of the chemical changes going on in that organ, but its presence in the bile is to be

<sup>1</sup> *Jahresbericht über die Fortschritte der Tierchemie für 1893*, p. 331.



accounted for mainly on the ground that this is one of the channels through which it can be excreted from the body. It is apparently a waste product, and not being easily decomposable it is eliminated unchanged, or in a slightly modified form, through the feces, as well as in the secretions from the skin, and in the milk. As a constituent of the bile it has, so far as known, no function to perform; it is purely an excretion, not of the liver alone, however, but of all the cells of the body, its elimination taking place mainly through the bile, possibly because this fluid is best adapted for its solution.

As just stated, cholesterin is not readily decomposed, but in the case of man, according to the recent experiments of Bondzynski and Humnicki<sup>1</sup>, a portion of the substance undergoes modification in the intestine, appearing in the feces as koprosterin; a body closely related to cholesterin, and apparently formed from it by the addition of hydrogen. In the intestine of herbivorous animals, as in the horse, the change is still greater, the cholesterin being transformed into a body known now as hippokoprosterin, a product representing still further reduction. In the dog, on the other hand, the cholesterin of the bile appears in the feces wholly unaltered. So far as known none of these modifications of cholesterin occur in gall-stones.

Naunyn's view that the cholesterin found in bile is wholly of local origin can hardly be accepted. It certainly cannot be true of the cholesterin present in normal bile, although it may possibly be true of the cholesterin contained in gall-stones. Thus, according to Naunyn, whenever there is a retardation, or arrest, of the flow of bile, the *bacillus coli communis* of the small intestine may migrate from its ordinary abiding place to the bile passages, and even to the gall-bladder where it sets up a peculiar catarrh of the mucous membrane. However this may be, it is probably true, as stated by Mayo Robson, that the appearance of gall-stones is always accompanied by catarrh which gives rise to thick, ropy mucus. In such cases, says Naunyn, the epithelial cells are found gorged with fat- or myelin-like material, which may protrude from the cell and float off in the bile. Addition of acetic acid to such masses is seen under the microscope to cause at once the separation of a magma of cholesterin crystals. The inference naturally is that the cholesterin is manufactured in the epithelial cell as a result of perverted metabolism, but it may be, as suggested by Von Noorden, that these cells simply take up cholesterin from the blood and then throw it out in masses. However this may be, it is noticeable, as a rule, that whenever a cholesterin

calculus is formed there is a nucleus of bilirubin-calcium around which the cholesterin is deposited. What now controls the formation of this insoluble calcium compound?

The normal bile pigments, bilirubin and biliverdin, when uncombined, are wholly insoluble in water. In the bile, however, they are held in solution, in part at least, by the alkali salts of the bile acids. Bilirubin and biliverdin alkali are readily soluble in water, but when soluble calcium salts are added to such a solution the pigment is precipitated as a calcium compound. Now, although normal bile contains a small amount of calcium, there is ordinarily no precipitation of the bile pigment, because of the restraining influence of the salts of the bile acids. If, however, an excess of a calcium salt is present, then precipitation may occur, insoluble bilirubin-calcium or biliverdin-calcium being formed. Frerichs, you may remember, has pointed out that the mucous membrane of the gall-bladder secretes lime salts, these passing into the bile; he states, indeed, that he has frequently observed the mucous membrane incrustated with crystals of calcium carbonate. This latter salt, however, itself insoluble, cannot be very efficacious in promoting the formation of bilirubin-calcium so long as the bile is alkaline. There is a general impression that normal bile is a strongly alkaline fluid. In one recent book on the chemistry of bile it is stated that this fluid contains about 0.2 per cent. of sodium carbonate, together with a like amount of alkaline-reacting sodium phosphate. But this is far from the truth. Indeed, the recent experiments of Jolles, as well as experiments now being carried out in my own laboratory, tend to show that bile does not contain any sodium carbonate whatever, and that such alkalinity as it possesses is due to salts of far less potency. In fact, when tested with phenol-phthalein as an indicator, the bile of man as well as the bile of the dog, cat, sheep, pig, ox, calf, etc., reacts acid. By this I do not mean that free acids are present, but that the fluid really contains acid salts, such as the alkali-hydrogen phosphate, which, however, may react alkaline to litmus and some other indicators. Now, Frerichs, you may recall, assumed that when the bile became stagnant in the gall-bladder, the mucus or nuclealbumin secreted by the bladder induced in some manner a decomposition of the salts of the bile acids by which the reaction of the fluid became acid. In this way the solvent action of the sodium glycocholate and taurocholate upon both cholesterin and bilirubin was removed, and consequently the cholesterin separated as such, while the bilirubin came down in combination with calcium. Obviously, as Gamgee states, this acid fermentation could not

<sup>1</sup> "Ueber das Schicksal des cholesterins im thierischen Organismus." *Zeitschr. f. physiol. Chem.* Band 22, p. 396.

originate spontaneously, but presupposes the intervention of some active agent, possibly a pathogenic organism of some kind. Further, Frerichs believed that not only must there be a pronounced stagnation of bile within the bladder, but, in addition, the co-operation of certain elements associated with catarrh of the lining membrane was required for this reaction to take place. Especially suggestive in this connection is the fact that gall-stones frequently contain in greater or less amount peculiar pigments that are rarely, if ever, found in normal bile; bodies such as the so-called bilifuscin and bilihumin which unquestionably originate from bilirubin or biliverdin as the result of changes, quite probably induced by micro-organisms. Consequently, we see that the old-time views of Frerichs and the more modern views of Naunyn are not so greatly opposed to each other as would at first sight appear. In both cases the formation of the calculus is attributed to chemical changes having their primary origin in the epithelial cells of the mucous membrane of the gall-bladder and the intrahepatic ducts, associated with general stagnation of the bile. How far the production of cholesterol is dependent upon these changes is uncertain, but, assuming that the cholesterol found in gall-stones is in great part a product of the perverted metabolism of the epithelial cells, it is still evident that the initial changes leading to the formation of a biliary calculus are connected with the calcium and pigment, rather than with the cholesterol, since the nucleus of the stone is more generally composed of bilirubin-calcium. In this connection it is to be noted that the amount of calcium salts contained in the food, as well as the amount in the blood, is no criterion of the amount present in the bile. In other words, the proportion of calcium in the bile is not noticeably influenced by the amount ingested, which fact naturally suggests that the deposition of bilirubin-calcium must be connected with pathologic changes, as a result of which the normal calcium of the bile is transformed into insoluble combinations, or else, as appears quite probable, there is an increased secretion of calcium from the epithelial cells of the mucous membrane by which the formation of insoluble combinations is facilitated. With such compounds as a nucleus the crystallization of cholesterol is made possible, especially if the reaction of the stagnant bile is so altered that the sodium glycocholate and taurocholate are dissociated, and their solvent action upon the cholesterol overcome. Add to this the hypothetical production of cholesterol by the mucous membrane itself, and we have all the conditions favorable for a speedy production of biliary calculi.

With a calculus once formed, either in the gall-

bladder or in the intrahepatic bile-ducts, the question naturally arises whether its removal can be accomplished by the action of any foreign solvent. To this I think we must give a negative answer, or to be more exact, I do not think we have any positive proof that its removal can be accomplished by this method. Indeed, it seems highly improbable. Far more plausible is the assumption that its solution may perhaps be brought about, in part at least, by agencies which tend to increase the flow and alkalinity of the bile, aided by an increase in the peristaltic contractions. Chologogue effects, however, are not readily obtained. Indeed, the most recent experiments of Stadelmann and his coworkers in Germany, as well as the experiments of Pfaff<sup>1</sup> in this country, tend to show that with the exception of bile itself, and possibly of sodium salicylate, there are no substances which act as true chologogues. Thus, the supposed chologogues, calomel, corrosive sublimate, rhubarb, podophyllin, turpentine, sodium benzoate, salol, etc., are practically inactive, and of little or no value in stimulating the secretion of bile. Quite different, however, is it with the salts of the bile-acids, for if these are introduced into the gastrointestinal tract their absorption is speedily followed by an increased secretion of bile; and of bile rich in bile-salts with their solvent action on cholesterol and bile-pigment. Obviously, such a line of treatment could be pursued with safety only when there is a free outlet through the bile ducts.

#### THE INDICATIONS FOR SURGICAL OPERATIONS ON THE COMMON BILE DUCT.<sup>2</sup>

By F. LANGE, M.D.,  
OF NEW YORK.

Of all the achievements of surgical art, which, within the last two decades, have widened its field, principally through the influence of antiseptic and aseptic technic, there is no perhaps no single one that involves so much responsibility and requires so much painstaking labor as an operation on the deep gall ducts. It is necessary to bear this in mind and to be conscious of the difficulties and embarrassing complications which may arise during such an operation, in order to meet the exigencies of a given case, and to follow step by step the banner of clear indication; to desist in time from fruitless attempts, or, with tenacity and perseverance, to push forward in spite of all difficulties, until the desired end is achieved.

It is well nigh impossible, within the time allotted

<sup>1</sup> Pfaff and Balch. "An experimental investigation of some of the conditions influencing the secretion and composition of human bile." *Journal of Experimental Medicine*, vol. 2, p. 49.

<sup>2</sup> Read at a meeting of the New York Academy of Medicine, April 15, 1897.



to me, to give an approximately thorough or exhaustive treatise of the subject of the surgery of the common bile duct; and I take the liberty of limiting myself to the question: Under what circumstances is surgical interference with the common duct in cases of gall-stone disease indicated?

Safe and absolute indications for operation exist only when we can foresee with certainty the further development of a morbid process. Is this the case with gall-stones in the common duct? Every practitioner knows that cases of protracted jaundice, due to obstruction of this duct by stone, will frequently end in spontaneous recovery. Jaundice may persist for years, unmistakable symptoms of an infectious process in the gall-duct system may be present, and still such patients may recover without surgical interference. As long as such possibilities exist, even as exceptions, it will be impossible to give general indications for operation. The latter, therefore, is dictated or modified, or contraindicated by the clinical history of each case. Individualization is of preeminent importance; from the clinical point of view, however, and for practical reasons, two large groups of cases may be subject to general consideration: Those in which pure obstruction is the governing feature, and those in which the obstruction is complicated by inflammatory and infectious processes.

Absolute obstruction to the flow of bile for a prolonged period of time, caused by stone in the common duct, is of rare occurrence. Frequently more or less bile will pass by the stone. In other cases, owing to an intermittent ball-valve action, as described and experimentally investigated by Dr. Fenger of Chicago, the stone, by its receding from the narrow opening, will allow of the intermittent free flow of the fluid. From the observations of reliable clinicians one may justly assume that quite a large percentage of cases in which gall-stones pass the common duct, do not present any distinct icterus at all. The mechanical lesion alone, therefore, as a rule, is comparatively well borne in uncomplicated cases of stone in the common duct, and it will depend largely upon the degree of obstruction, whether the damaging influences of stagnating bile are such that the removal of the obstructing cause by operation is indicated or not. The physician in charge ought to be aware, however, that long persistency of intense icterus diminishes the safety of surgical interference through the cholemic condition of the blood and the morbid tendency to bleeding. In cases of uncomplicated obstruction of the common duct, therefore, we may formulate the indication thus: They require surgical help before persistent cholemia has increased the danger of an operation to an unnecessary and undue degree; and though icterus alone

may occasionally be well borne for a long time without serious impairment of the general condition, we must, with the onset of such, determine the exact indication for surgical interference. I have had the misfortune to lose three patients after operations on the gall-duct system from uncontrollable hemorrhage due to cholemia. One of them had been subjected to choledochotomy, one to cholecystenterostomy, one to cholecystotomy. All these patients presumably would have been saved if operation had not been delayed from month to month, after all possible useless remedies had been tried for the expulsion and dissolution of gall-stones. The character of the hemorrhage in such cases is that of capillary oozing, especially from the surface of the gall-duct system or from adhesions in the abdominal cavity. I once had the impression that the sudden relief from pressure on the surface of an overdistended gall-bladder had something to do with it.

The second group of cases of obstruction are those in which complications arise, either by an infectious process, when we have to deal with cholecystitis and cholangitis in their various degrees and after-effects, or by ulceration as the direct consequence of impaction. In the latter instance it is not so very uncommon for spontaneous recovery to occur, the stone or stones passing through the wall of a neighboring viscus. To eliminate these cases we might say that they admit of expectant treatment. If a large stone has once been passed per rectum; if there should be a repetition of the attacks we may fairly assume that stones will pass again spontaneously and the obstruction be relieved. As a rule, one assumes that stones of more than moderate size will pass by a perforative process. If, however, the symptoms of intense obstruction or progressive septic infection should become very marked, an operation may be imperative.

Infection sometimes presents a decided indication for immediate surgical interference. It manifests itself by the symptoms of acute fever with frequent chills. The skin is deeply jaundiced, and the gall-bladder may be distended and readily palpable, but this symptom is absent in cases in which the walls of the viscus have become thickened by a previous inflammatory process. Such cases of acute cholangitis should be operated on at once. The first indication is to relieve stagnation and tension, and this is done by cholecystotomy. Whether the obstruction of the common duct ought to be dealt with at the same time depends upon the general condition of the patient. These cases are exceptions, but they ought to be dealt with according to surgical principles.

By far the greater number of cases are of a chronic or subacute character. The presence of a stone or stones in the common duct will keep up a permanent

irritation, and chronic infectious processes will gradually spread over the surface of the gall-ducts. Dilation of the ducts, atrophy of the glandular liver tissue, cholangitis, pericholangitis, and finally liver abscesses, usually of the disseminated variety, will be the end stages of this morbid process. We must bear these possibilities and their unfavorable prognostic elements in mind, and realize that the removal of the obstruction and the bringing about of a free flow of the secreted bile is the only rational method of treatment. With our present experience with the technic, we may safely say that choledochotomy, in the majority of cases, is a difficult and tedious operation, which may tax to the utmost the resources of the patient, but its results usually are eminently favorable. Among my successful cases I have had several in which unmistakable symptoms of chronic cholangitis existed at the time of the operation, but gradually yielded after removal of the stones, and in the course of months resulted in complete *restitutio ad integrum*.

Let me mention here the valuable observation of Riedel, that a gall-stone in the common duct will occasionally be the cause of a chronic inflammation of the pancreas, and that in such cases we may be much in doubt whether the hard mass under the examining finger indicates a malignant growth of that gland or an inflammatory thickening. It is useless to emphasize the very different prognostic value of these two affections. To differentiate cases suitable for choledochotomy from those in which it is preferable to leave the stones *in situ* and to resort to cholecystenterostomy, would, I fear, lead me too far into the discussion of the purely surgical aspect of the question, and beyond the limits of the allotted time. Let me emphasize once more, that preservation of life and health in many cases of gall-stone in the common duct depends upon the proper time chosen for surgical interference.

#### DISTOMA HEMATOBIIUM; DESCRIPTION OF A CASE.<sup>1</sup>

BY FREDERIC E. SONDERN, M.D.,  
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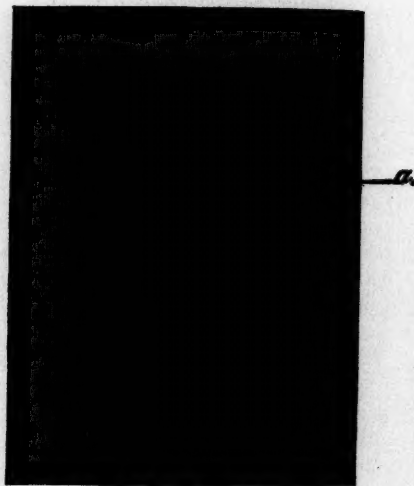
THE distoma hematobium, discovered by Dr. Bilharz<sup>2</sup> of Cairo (1851) in the portal system, is generally named *distoma*, from the Greek *dis* for *dis*, and *stoma*, and should, therefore, not be called *distomum*, although Bilharz employed the latter term. Some years later, Cobbold<sup>3</sup> gave the species the name "*Bilharzia*," in honor of the discoverer; and other names, such as *gynacophorus hamatobius* (Diesing<sup>4</sup>), etc., have since then fallen into disuse.

<sup>1</sup> The case here described is the same one mentioned in the *Medical Record* of April 3, 1897, by Dr. H. T. Brooks, who, I am told, did not see the patient but made an analysis of his urine.

An examination of one private library only, that of Dr. A. Jacobi, permits of the statement that "English and American text-books on medicine, urinary diseases, and clinical microscopy," are *not* unsatisfactory, as Dr. Brooks would have us believe, but, on the contrary, many offer lengthy, well-written, and well-illustrated articles which exhaust the subject thoroughly, in proof of which I refer to Harrison,<sup>5</sup> Roberts,<sup>6</sup> Cobbold,<sup>7</sup> Guillemard,<sup>8</sup> the English editions of v. Jaksch, and Ziegler, the works of Fenwick, Beale, Curtis, and Handford, as well as more than thirty-eight original articles scattered throughout English and American medical journals. A most excellent index of this literature has been compiled by J. C. Huber.<sup>9</sup>

The geographic distribution of the *Bilharzia*, according to Ruetimeyer,<sup>9</sup> includes not only the west

FIG. 1.



Egg of the *distoma hematobium*. a. Beginning formation of stomach of embryo. Microphotograph  $\times 430$  diam. Zeiss apochromatic, 4 mm.

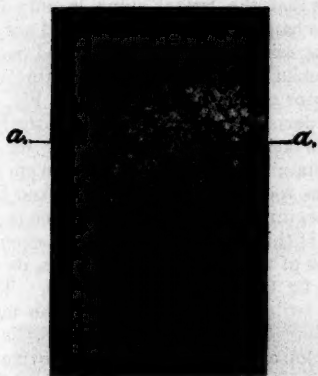
coast, but also the east coast of Africa (Eyles<sup>10</sup>), particularly Egypt, where the most severe cases are observed, and Cape Colony. Wortabeh reports cases in Syria and Sicily. Blanchard does not credit the cases reported from Madagascar and Mauritius, believing them to be due to the *filaria sanguinis*. It is also doubted if the twelve cases reported by Hatch<sup>11</sup> originated in India. Nor can I find records of fully authenticated cases having originated in Arabia or Brazil, statements to the contrary notwithstanding. Hirsch emphasizes the occurrence of the parasite on the seaboard, and at the mouths of rivers, up to ten miles inland, in countries where it is endemic; Egypt seems to offer an exception to this.



Ruetimeyer concludes that the endemic origin of the disease has not crossed to the eastward of the Suez canal.

As to the etiology, Sonsino's<sup>13</sup> investigations during the summer of 1893 are now generally accepted,

FIG. 2.



Egg of *distoma hematobium*. a. Development of duct on each side of embryonic stomach. Microphotograph  $\times 230$  diam. Zeiss apochromatic, 4 mm.

according to Ruetimeyer and others, and if so would antiquate the quotations from Lenharz. They would also allow the conclusion that the simple filtration of water, even if only [through a cloth, is a sufficient prophylactic measure.

The anatomy of the *Bilharzia*, a unisexual trematode worm, has been carefully described even by the older authors, Fritsch,<sup>14</sup> in 1888, adding more details. As these more recent descriptions are to be found in text-books they need no repetition here. Contrary to the quotations of Dr. Brooks, I would add that according to Fritsch, the worms are oftentimes but half the length he states. They have but one sucker and one mouth, not two suckers. The female is taken up in the *canalis gynecophorus* of the male for copulation, and, while remaining there for some time, is not carried there as was stated.

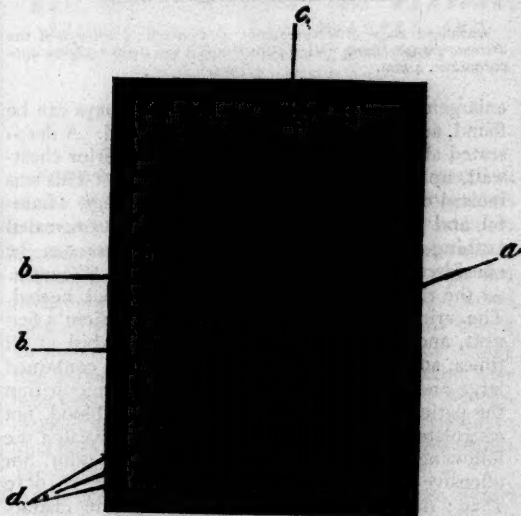
The pathologic anatomy of the condition in question is likewise of interest, and has been minutely described by Ruetimeyer, to whose painstaking and original work I would refer. Contrary to Dr. Brooks' statement, Ruetimeyer and others have not been able to find pathologic conditions in the human spleen.

The following case, which is the same one referred to by Dr. Brooks under dates of March 20 and 25, 1897, has been under the continuous observation of Dr. A. Jacobi since March 22, 1897, with whom I have followed it daily since then. To him I am indebted for the careful and detailed examinations, and the privilege of reporting it. I repeat the clinical history on account of additional data.

R., male, thirty-two years of age. Born in Russia. Family history negative. General health always good. From 1885 to 1893 he resided in England. On December 15, 1893, he went by steamer, via Lisbon, Madeira, and Cape Town, to Port Elizabeth, South Africa, arriving on January 15, 1894. He resided there for six months. During this time he took frequent baths in the bay and river, and admits that he probably swallowed some of the water. At other times he drank both hydrant and spring water. His health was good, excepting one attack, of short duration, of severe pain in the region of the bladder, which radiated into both groins.

Leaving Port Elizabeth in June, 1894, he resided for the following six months in Kimberly, West Griqualand, during which time he was apparently well, with the exception of another attack of pain as above, without diarrhea. He also had a short attack of "fever." At the end of November, 1894, he left Kimberly for Cape Town, where he remained one week. Leaving the latter place on December 5, 1894, he proceeded by steamer, via Madeira and Lisbon, and arrived at Portsmouth, England, on December 26, 1894. He remained in London until January 5, and sailed from Southampton for New York on that day, arriving here on January 12, 1895. On January 15, 1895, three days after land-

FIG. 3.



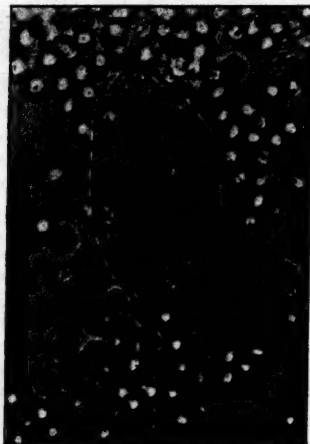
Embryo and egg-shells of *distoma hematobium*. a. Embryo, with cilia. b. Ducts on each side of stomach. c. Burst shell. d. Liberated sarcoid globules. Microphotograph  $\times 300$  diam. Zeiss apochromatic, 4 mm.

ing, he observed, for the first time, a small clot of blood at the end of micturition, without tenesmus or increased frequency of urination. This recurred about once daily at first, but gradually increased in frequency and amount for three months, since which time, for a period of two years, it has remained about the same, some blood appearing at the end of every micturition. Occasionally slight tenesmus and

burning in the urethra has occurred. He does not recall when the urine first became turbid, but remembers that it has not been at all clear for some time, with the exception of a short period while under treatment for "cystitis and Bright's disease," at his home in Georgia.

Physical examination shows normal lungs. No

FIG. 4.



Advanced stage of development of stomach of embryo of the *distoma hematobium*. Microphotograph  $\times 350$  diam. Zeiss apochromatic, 4 mm.

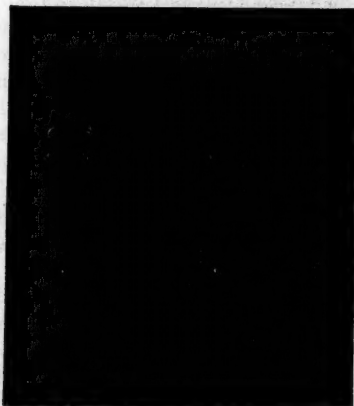
enlargement of the liver, spleen, or kidneys can be found, and his general health is fairly good. A deep-seated abscess was found on the right anterior chest-wall, not mammary, as it was described. This was incised on the forenoon of March 25, 1897. Careful and repeated examinations of the pus revealed nothing pathognomonic, and this process can be considered as not connected with the *Bilharzia*. At the time of writing, this abscess is about healed. The urine voided at the time of the patient's first visit, and subsequently, was distinctly turbid at all times, sometimes tinged with blood, and contained large and small flocculi. At the end of micturition the patient passed from 1 to 10 c.cm. of blood, not coagulated. Examination of the urine revealed the following: Turbid color; amber to red; odor, not offensive; reaction, acid; specific gravity, 1016 to 1020; deposit, fairly marked, and heavy in character; urea, 0.02 to 0.024 gram in 1 c.cm., and 32 to 35 grams in twenty-four hours; albumin, present, but not more than the blood, pus, etc., would account for; sugar, none; bile, none; phosphates, considerable excess; chlorids, approximately 0.01 to 0.15 gram in 1 c.cm.

**Microscopic Examination.**—Rather large quantities of blood, pus, and mucus, and many epithelial cells of all the layers of the bladder; also, intact aggregations of the same. Renal elements could not be found, nor were evidences of a pyelitis to be made out. The absence of a renal lesion thus indicated is

corroborated by a normal daily excretion of urea as above. In addition to the above, every specimen showed a small or large number of the eggs of the *Bilharzia hematobia*, which settled the diagnosis.

These ova vary much in size, shape, and state of development, but all have a transparent shell with a terminal spine. Harley,<sup>14</sup> Brock,<sup>15</sup> Zancarol,<sup>16</sup> and others state that the lateral spine is only found on the eggs discharged from the bowel, and not on those found in the urine. The less developed ova show a mass of granular protoplasm, with no distinct structure on the interior of the shell, as shown in Fig. 5. The more fully developed eggs, seen in a recently voided specimen of urine, show the shell and its spine as before, containing the more distinct ovum made up of numerous round and circularly marked bodies or cells; the beginning of which may be seen in portions of Fig. 5. If this is carefully observed, even without the addition of water, in many instances, its development may be followed under the eye. There are occasional twitching movements of the mass, and then a rudimentary organ (the stomach) is seen to slowly develop at the upper end of the ovum, as seen in Fig. 1. This gradually elongates, and an advanced state is shown in Fig. 4. This is followed by the formation on each side of the above sac of two hollow spaces, which gradually develop granular contents; the beginning of this structure may be seen on one side of Fig. 4, and more complete in Fig. 6. These then elongate into two ducts, shown slightly in Fig. 2. At the same time several large round cells are developed posteriorly (Fig. 2), the so-called sarcodae globules of Cobbold. Cilia then appear on

FIG. 5.



Egg of *distoma hematobium*. No distinct internal structure. Microphotograph  $\times 350$  diam. Zeiss apochromatic, 4 mm.

the surface of the embryo. During this time the embryo executes spasmodic movements, and sooner or later the shell bursts longitudinally, whether by the efforts of the embryo, or by transudation of fluid into the shell, is not settled, and then, after escaping, the embryo moves about with furious lashing of the cilia. Fig. 3 shows the embryo with cilia, also the two



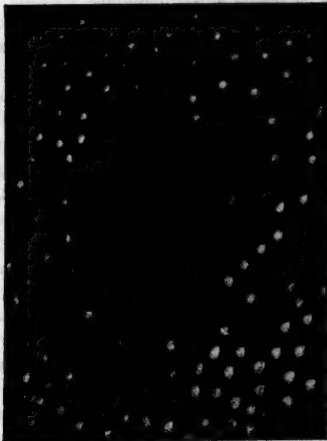
ducts before mentioned, as well as the empty shell. Soon after the liberation of the embryo it discharges the sarcode globules, also seen in Fig. 3, and continues to swim about empty for a time.

It is a most difficult task to obtain these microphotographs, as the changes the embryo undergoes are oftentimes so rapid that they have passed before the necessary manipulations for an exposure can be completed. The movements of the embryo at the time of exposure also ruin many plates.

The period of incubation of the *Bilharzia* is generally considered to be short (a few weeks). Hatch reports a case in which it was four weeks. This period for our patient has been forty-one days at the very least, counting that the infection could have occurred during his very last day on African soil.

**Treatment.**—Gallic acid was administered in gram doses four or five times a day, which materially diminished the amount of pus and almost

FIG. 6.



Egg of *distoma hematobium* showing hollow spaces. Microphotograph  $\times 350$  diam. Zeiss apochromatic, 4 mm.

stopped the hematuria. For some days methylene blue (Merck) has been given in addition. At the time of writing, the amount of pus is very much less, and for a few days there had been no blood at all, but it appeared again in very small amounts at infrequent intervals. The ova are present still in large numbers, and while they have been closely observed from day to day, I noted for the first time, on April 5th, that a small number had taken up the blue coloring matter now present in the urine. Those that do so are found to be dead; if the blue is the cause of death, or if only the dead ones take it up, I am at present unable to say. Fouquet,<sup>17</sup> Sonsino, and Wortabeh have written articles on the therapy of the condition.

As to prognosis: Most of the authorities agree that many of the cases regain health with little or no treatment; in other words, barring reinfection, the condition is a self-limited disease. There are of course

fatal cases where the parasite is the cause of severe cystitis, hydro- or pyonephrosis, nephritis, dysentery, severe anemia from the loss of blood, etc. Tuberculosis and carcinoma, as well as renal and vesical stones, are very common with *Bilharzia*, and in what connection they occur with the latter, whether due to a consequent irritation or to other causes is, according to quoted authorities, still an open question.

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## HOSPITAL REPORT.

UMBILICAL SEPSIS IN THE NEWBORN,  
OCCURRING AT THE NURSERY AND  
CHILD'S HOSPITAL, NEW YORK,  
DURING 1896.

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OF NEW YORK;

EX-VISITING PHYSICIAN TO THE HOSPITAL.

It has been the misfortune of the obstetric department of the Nursery and Child's Hospital to lose five babies from umbilical sepsis during the past year. In addition, a number of patients have presented symptoms of a milder degree of the same infection. The following facts and deductions are derived from a study of all the babies born at the hospital during the twelve months ending December 1, 1896: There have been 169 births during this period. The history charts of three of these have been mislaid, and are therefore not available. Thirteen children, born prematurely, died of inanition a few hours after birth, and six children were stillborn. There remain 147 cases for study.

The normal process of healing of the umbilical wound is of a double nature, consisting of the mummification of the stump of the cord plus the granulation of its point of attachment, and its healing by second intention. The navel of a newborn child consists of a quite prominent circular fold of skin, which surrounds and extends upward on the gelatinous cord to which it is attached quite firmly. During the mummification of the cord, the blood-vessels and surrounding Whartonian jelly dry up and become transformed into a hard, contracted, brittle mass. The attached base is separated from the living tissue underneath by a process of granulation. After the stump has

separated, the central mass of granulating tissue contracts and recedes below the general skin level of the abdomen, and at the same time the circular fold of skin contracts, and finally becomes level, or nearly so. The central ulcer cicatrizes, and the navel is healed. A fixed time limit as to when this normal process should be ended cannot be determined. It is usually completed before the end of the second week of life. During this period of fourteen days every child must accommodate itself to a number of changes in its physiology, and all abnormal symptoms cannot be attributed to any one cause. Infection of the umbilicus is not uncommon, and should be thought of in the case of every ill baby under one month of age.

The pathology of the navel of the newborn child may be included in the one word "sepsis." The question is purely one of wound infection by one or more varieties of bacteria. This wound is a granulation wound, to the surface of which certain dead tissues (the cord) are adherent. The infection may be saprophytic and limited to the cord, or truly pathogenic, the germs invading the living tissue, or both forms of infection may exist at the same time. The germs of decomposition cause local symptoms in the stump of the cord; an odor of decaying animal matter and an abnormal amount of moisture is present, and there is a delay in its separation. Serious effects have not resulted to the baby from such decomposition, but the liability to pathogenic infection is undoubtedly increased by such a process. The lesions resulting from the infection of the umbilical ulcer are the same as occur in any wound. Any of the following forms of inflammation may result: Erysipelas, cellulitis, gangrene, lymphangitis, phlebitis, or arteritis.

The symptoms of umbilical sepsis may be limited to the local evidences of inflammation, or to these may be added general symptoms of a systemic infection. The local signs vary with the form of inflammation. Excessive granulation with discharge of pus, infiltration of the surrounding skin, with or without the formation of abscesses, or more or less extensive gangrene may be present. Erysipelas or lymphangitis starting from the umbilicus will present the usual diffuse or limited redness characteristic of these lesions. The very fatal inflammations of the umbilical vein and of the hypogastric arteries give no positive local signs of their existence; they may be present with any of the forms of local inflammation just mentioned. The general symptoms of septic infection are fever, loss of weight, jaundice, skin eruptions, gastro-enteric symptoms, abscesses, thromboses of the veins or arteries.

In the series of cases under consideration fever has been observed 95 times, and granulations of the umbilicus have demanded treatment 47 times. Eighteen patients showed quite decided evidences of sepsis, and of these five died. The following will show the day the cord became detached, all the patients being included in the list, except two, who died with the cord still attached: Fourth day, 2 cases; fifth, 12; sixth, 18; seventh, 23; eighth, 16; ninth, 22; tenth, 16; eleventh, 12; twelfth, 7; thirteenth, 9; fourteenth, 4; fifteenth, 2;

sixteenth, 1; and nineteenth, 1. This table, which includes all cases, septic or otherwise, shows that in 119 cases (eighty per cent.) the stump of the cord came off between the fifth and eleventh days. The granulation and final healing of the umbilical ulcer has not been the subject of such careful observation as the separation of the cord. Forty-seven cases are recorded as having moist granulations after the separation of the cord, and thirty-five of these received special treatment to assist the delayed healing of the ulcer.

The first thing which becomes evident in a study of the cases is the prevalence of fever during the months of July, August, and September. During these months forty cases were recorded. Of these forty, only four cases remained free from fever reaching 100° F., or more. This real epidemic was characterized by a peculiar skin eruption, which is described below, and was coincident with the delivery in the wards of one of the patients who became ill of a very virulent sepsis, from the effects of which she died. No effort was made to connect the two events by bacterial examinations.

The fever of sepsis runs quite an irregular course, and serves more as an indication that infection exists than as a guide to the severity of that infection. It is the pulse-rate and heart action which must lead to an appreciation of the prognosis in any case. There have been ninety-five cases of fever among the 147 cases, or sixty-five per cent. These temperatures occur either during the first four days of life or develop after the first four days, or they run through both the early and the later days of the first fortnight. There were fifty-four cases of initial temperature alone, fifteen cases of later temperature, and twenty-six cases of both forms combined. Dr. Holt distinguishes one class in connection with such initial temperatures. Those cases which begin soon after birth and which cease upon the exhibition of food are designated by him "inanition temperatures," and are due to starvation. The following facts indicate that there were several causes present to account for the temperatures met with. Fifteen of the eighteen cases which were undoubtedly septic presented an initial temperature; thirty-three of the thirty-seven cases of fever occurring during the epidemic-like outbreak were initial temperatures, and in seventeen of the thirty-three patients there was a subsequent rise in temperature. Eleven of the thirty-three became infected and two died of the disease.

The relation of a moist granulating navel wound to fever is shown by the following statistics: Of the 47 cases of granulating umbilicus, 15 patients had "initial fever," 8 had a later rise of temperature, and 10 had both forms. Only 14 remained free from a rise of temperature. An average of 8 of the 18 septic cases shows that the gastro-enteric symptoms disappeared on the twenty-first day, and the bowels became normal. The remaining 10 patients continued to have undigested mucous stools as long as they were under observation. None of these cases presented the clinical picture of pyemia, so that abscesses were conspicuous by their absence. The twenty-first day was the average one upon which 11 of the 18 septic patients regained their birth weight; the remaining 7 did

not regain their birth weight at all. The total loss of weight amounted to 32, 42, 11, 24, and 18 ounces in the patients dying of sepsis on the twenty-second, twentieth, nineteenth, twelfth, and fifteenth day, *postpartum*, respectively. The milder cases of sepsis showed loss of weight, but to a much less degree, the average initial loss of the 18 septic cases being 13 ounces. The average initial loss met with in the fever cases was 11 ounces, and in the non-febrile cases 9 ounces. It must be inferred, therefore, that the initial loss of weight is a fair index of the child's general condition, and that an excessive loss is characteristic of at least one serious condition, namely, a beginning sepsis.

None of these patients suffered from the severer forms of icterus, which are apt to accompany the inflammations of the umbilical vein. The four autopsies showed that the arteries rather than the vein had been attacked by the septic process. Jaundice is a very common symptom in the newborn child, and has no diagnostic value in connection with septic infection unless it develops to an extreme degree. Of the fatal cases, not one patient died jaundiced, and only one was jaundiced during the course of its illness.

Sixty-one cases of jaundice occurred in the series of 147 cases. Of these, 7 patients presented symptoms of sepsis. These 61 cases may be arranged according to the day on which the jaundice was last noted, as follows: As late as the third day in 8 cases; fourth, 5; fifth, 14; sixth, 8; seventh, 2; eighth, 4; ninth, 3; tenth, 3; eleventh, 1; thirteenth, 1; fourteenth, 4; sixteenth, 1; eighteenth, 3; twenty-first, 1; twenty-second, 1; twenty-eighth, 1, and thirtieth, 1.

There was only one form of septic eruption met with, and it occurred in 8 children born between July 17th and September 14th. The eruption was like that of pemphigus, and consisted of bullæ varying in diameter from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches. They contained blood-stained serum. Of these 8 patients, 2 died. This outbreak was of the nature of an epidemic, as described above. The distribution of the eruption indicated the presence of a general infection, for it was not directly connected with the umbilicus. The bullæ occurred on the neck and face in five cases, and on the trunk in three. The cases did not look like those of syphilitic pemphigus, and the eruption was not present to any extent on the extremities. Two cases of syphilitic bullous eruption occurred early in the year, and each ran its course without fever as a prominent symptom.

The fatal cases present the most typical pictures of infantile sepsis.

**CASE I.**—The child was delivered by forceps. It lost weight from birth until the fifth day, then gained in weight one day, and finally lost daily until it died on the twenty-second day, *postpartum*. Fever began on the second day and was continuously present, except on the sixth day. The stools were always green, and the baby vomited. The cord came off on the fourteenth day, and the umbilicus showed no evidence of inflammation, except that a band could be felt extending upward along the course of the umbilical vein. The right foot became swollen, and the heel and toes gangrenous.

**Autopsy.**—The umbilicus appeared normal. In the umbilical vein there was a fusiform clot three inches in length. There were also small clots in the arteries, and beneath them small collections of pus in the tissues. There was a firm clot in the thoracic aorta extending down to the bifurcation, and a clot in the right femoral artery at the middle third of the thigh, extending into the popliteal space, but not beyond. The left femoral artery was free, but a firm clot in the left femoral vein extended upward to the bifurcation of the iliacs. The right iliac vein was free, and no clot was present in the inferior vena cava. There was an extensive ulceration in the colon. Cultures from the pus in the tissues showed the presence of staphylococci.

**CASE II.**—This child was born after a dry labor lasting fifty-eight hours. It lost seventeen ounces in three days, and continued to lose until at the time of its death, on the twentieth day, it had lost forty-two ounces. It had a low fever until the sixth day, and from the sixth day until death occurred its daily temperature ranged between  $101^{\circ}$  and  $104^{\circ}$  F. It vomited frequently and had a green, mucous diarrhea.

**Autopsy.**—On opening the abdomen the umbilical vein appeared to be normal. The right hypogastric artery appeared swollen and reddish for a distance of three-quarters of an inch from the umbilicus. On manipulation, grayish-brown, grumous pus escaped from the umbilicus, and a probe was readily introduced into the artery, which collapsed with the escape of its contents. The left artery contained a firm clot. A culture of the pus from the right artery showed a pure culture of the combined staphylococcus aureus and albus. The cord was still adherent.

**CASE III.**—The child was born in easy labor. It had lost fourteen ounces by the fourth day, but then gained in weight slowly until the sixteenth day, but never reached its birth weight. From the sixteenth to the nineteenth day it lost in weight. The first occurrence of fever was noted on the seventeenth day, and this continued until death. The bowels were never normal, and the baby was jaundiced during the first week of its life. The cord was still adherent.

**Autopsy.**—There was a fusiform swelling of the right hypogastric artery just below the umbilicus, which, upon being incised, allowed the escape of bloody pus. The left artery and the vein were normal. The cord was attached to the umbilicus, and at its base there was an excoriation extending about one inch in every direction. No cultures were made.

**CASE IV.**—Labor was normal. The child lost twelve ounces on the fourth day, and then continued to lose steadily until the twelfth day, when it died. Its temperature rose suddenly to a high point on the second day, and continued most of the time above  $102^{\circ}$  F., until death occurred. The bowels were never normal. There was no vomiting. A pemphigus-like skin eruption appeared on the fourth day upon the neck, and spread rapidly over the shoulders. The cord came off on the sixth day.

**Autopsy.**—On opening the umbilicus it was found to



contain a discolored, yellow, liquid mass, which seemed to extend through into the artery and vein.

CASE V.—This child was born two days after the one whose history has just been given. It lost 12 ounces in weight on the third day, and 18 ounces on the fifteenth, when it died. From the third until the twelfth day it gained, but never reached its birth weight. There was an initial temperature of three-days' duration, reaching 101.2° F. From the fourth to the twelfth day there was no rise of temperature, but during the last three days the temperature ranged between 99° and 102° F. The bowels were never normal. The cord came off on the tenth day, and the umbilicus contained pus, but there was no tenderness about it. An eruption on the child's neck and abdomen, similar to that met with in the last case, began on the fifth day, but was not very extensive. No autopsy was allowed.

The plan of treatment in vogue at the Nursery and Child's Hospital is as follows: After pulsation in the cord has ceased, it is stripped of Wharton's jelly toward the placenta, and then ligated, usually about an inch and a half or two inches from the navel, another ligature being placed on the placental side. The cord is cut with dull scissors close to the first ligature. The remaining portion of Wharton's jelly is squeezed out, the cut end of the cord is thoroughly sponged with a solution of mercuric chlorid, and then thoroughly mopped and dried with sterile absorbent cotton. Some kind of powder is dusted over the stump and its base, and the dressing is completed by a wrapping of sterile cotton or gauze, which is tied on with sterile tape. The original cotton or gauze dressing is not disturbed or removed unless it becomes wet. The base is dusted only with some drying powder twice daily until the cord falls off. The baby is gently sponged twice daily with warm water, and wiped perfectly dry; it does not receive a hot bath until the cord has become detached and the umbilicus has healed.

The question of prophylaxis against infection of the navel is considered under two heads: First, the adoption of means to hasten the drying of the stump of the cord; second, the prevention of the access of bacteria to the umbilical ulcer. The accepted views of to-day concerning the bacterial causes of inflammation have led the writers of all recent text-books which treat of the subject to insist upon the importance of the last-named measure, but at the same time they have lost sight of the equally important matter of hastening the drying of the dead tissue of the cord. The routine treatment of the cord advised by these authorities consists in the application of an aseptic occlusive dressing of absorbent cotton, either sterilized or medicated with boric acid, to which is added some form of antiseptic powder.<sup>1</sup>

The old method of dressing the cord is well described by Dr. C. D. Meigs in his "Obstetrics," published in 1856. The dressing consists of a piece of linen four by eight inches in size, which is folded to a square. A slit is cut in the center of the double square, and then, to

*quote verbatim*, "Through this slit let the remnant of the navel string be passed so as to let the double disk of linen lie upon the belly of the infant. The cord should be laid down flat upon the disk pointing upward toward the scrobich, and the linen should next be turned up so as to cover it. The right side should be turned over the cord to the left," and *vice versa*, etc. This passage is quoted in full, because of its bearing on certain conclusions which have been drawn from experiments detailed below.

Dr. M. Cohn<sup>1</sup> of Berlin has recently published an article on septic infection of the navel, in which he details certain experiments made to determine the conditions which influence mummification of the cord. The following experiments are, in part, a repetition of those made by him, having the same object in view: The cords of seven placentae were taken and cut into pieces about two inches in length. A ligature was tied about the ends of each piece, which were thus made to resemble as nearly as possible the portion of the cord left attached to the umbilicus. One piece was treated in the same manner as was the stump on the child, while other pieces were given various kinds of treatment, and the condition of the separate pieces was noted daily. These pieces, wrapped in their experimental dressings, were rolled up in a flannel binder, such as is used on a baby's abdomen, and placed upon a shelf in the hospital laboratory. This room has gas burning in it during every hour of the day and night, and is always dry and warm, so that the conditions are conducive to the desiccation of any dead tissues left in it. The results obtained by treating these pieces of cord were as follows: Pieces of four cords were powdered with boric acid, bismuth subnitrate, talcum, or starch, and wrapped in absorbent cotton and flannel in the manner described. It made very little difference which form of "drying powder" was used. If anything, the talcum seemed to act quickest. Pieces of two of these cords were dressed with cotton alone, without any powder whatever, and both dried up more quickly than any of the pieces to which the powder had been applied. Pieces of three of the same cords were hung up exposed to the air; two of them in a hot, dry room became dry and brittle in twenty-four hours; the third, a piece of the thickest cord, was hung in a cold room by an open window; it also was perfectly dry in twenty-four hours, but did not become brittle until the second day. The inference is very plain, and coincides with that drawn by Cohn from the similar experiments conducted by him. *It is the access to the air which furthers the mummification of the stump of the cord, and all ordinary drying powders and all occlusive dressings are a hindrance to that process.*

In order to discover the effect of shutting off the access of air entirely, a piece of cord was hung free in a stoppered bottle. On the third day it was in a moist condition of stinking decomposition. Even such a piece of foul-smelling cord will become dry and brittle when exposed to the air for twenty-four hours. The stearate of zinc is a comparatively new drug which has been recommended

<sup>1</sup>As examples of these authorities, compare "Précis d'Obstétrique," by Lepage & Ribemont-Dessaignes; "Lehrbuch der Geburtshilfe," by A. Martin, and the "American Text-book of Obstetrics."

<sup>1</sup>Therapeutische Monatshefte, 1896, 2, 3, 4.

for local applications; it is claimed that it permits free access of air to the wound. Pieces of these cords treated with it and wrapped in cotton became dry and brittle more rapidly than did any of the pieces mentioned above. Calcium chlorid is a powder that possesses marked hydroscopic powers. Pieces of cord treated with it became dry in twenty-four hours, and the surrounding absorbent cotton was so moist that several drops of fluid could be squeezed from it. A piece of cord hung in a bottle containing a considerable amount of chlorid of calcium was dry in twenty-four hours. Schep<sup>1</sup> of Berlin has recommended the use of a two-per-cent. solution of nitrate of silver on the cord twice daily. The pieces of the cord treated in this way did not show more rapid dessication than pieces of the same cord treated in other ways. Nitrate of silver failed to prevent the decomposition of a piece of cord hung in a bottle. A comparison between the occlusive properties of absorbent cotton and those of absorbent gauze resulted in favor of gauze as a dressing for the cord, thus demonstrating the advantages of the older method advocated by Dr. Meigs over that described by later writers.

These various experiments were repeated in the umbilical dressings of living infants. The results in eight cases were as follows: Stearate of zinc was used four times with satisfactory results. The cords dried up even more rapidly than the pieces of the same cords treated with the same agent in the laboratory. One cord was treated with a two-per-cent. solution of nitrate of silver twice a day. It dried up very quickly, and was brittle on the second day. The cord of another baby was left exposed to the air, through a hole in the clothing, without dressing of any kind; it was dry and brittle in twenty-four hours, as were the pieces hung up in the laboratory. Two cords were treated with powdered calcium chlorid. They dried up within twenty-four hours, but the liquefied drug soaked through the clothing of the child, and proved irritating to the skin of the abdomen, though no harm resulted from its use. Although both cords were completely dry on the first day *post-partum*, they only separated on the fourth and eighth days, respectively.

The second point in the prophylactic treatment of the umbilical wound is the prevention of the access of bacteria to it. No one can deny the necessity for this, but the means adopted should not hinder the drying process in the cord. The point of danger is the attached base of the cord, and the period of danger ends, not with the separation of the cord, but with the cicatrizing of the granulating surface beneath it.

In conclusion, it may be said that a proper umbilical dressing consists of a gauze or linen covering for the stump, applied without "drying powder." The base of the cord should be surrounded by an occlusive dressing, but the cord itself should be exposed frequently to the air. The care of the baby during its first ten days of life is important. A daily full bath should usually be omitted until after the navel is healed, and the umbilicus should be protected from all moisture, especially from the urine of the child. If the dressing on the cord becomes wet,

it should be changed at once. Of all the powders experimented with, the stearate of zinc seems to be the best. Calcium chlorid is a great absorber of water, but its solutions are too irritating to allow of its being recommended for general use.

When a septic process has once begun its treatment is very unsatisfactory. All abscesses should be opened and the gastro-enteric symptoms controlled as much as possible by change of food and lavage of the stomach and intestinal tract. Drugs are of little or no value, and food and stimulants make up the whole pharmacopeia for newborn babies.

I wish to express my thanks to Drs. Edgerton, Neumann, and La Fetra of the house staff for their efficient aid in searching the hospital records, and for assistance in making the various experiments.

## MEDICAL PROGRESS.

*Disinfection of Soiled Linen.*—BEYER (*Fortschrit. de Médecine*, No. 1, 1897) has tested different methods employed for the disinfection of bed linen and underclothing. The ordinary methods by boiling are not suited to these articles, as the presence of blood, pus, and feces causes an ineradicable stain if a high temperature is used. Soaking the garments in solutions of various soaps for one or two days failed in every instance to kill cholera, typhoid, and pyogenic organisms which were mixed with the feces with which the garments were smeared. In some cases the germs were killed when the solutions containing the linen were kept at 50° C. for a few hours. With lime-water the results were much better. Sample garments which were soaked in this solution for twenty-four hours were found to be sterilized. An equally good result was obtained in a hospital where about one-half a cubic meter of soiled linen was soaked in lime-water for forty-eight hours—or for twenty-four hours if the clothing was first rinsed with lime-water and then placed in a fresh solution. The lime-water does not injure linen or cotton goods, but shrinks woolen to such an extent as to prevent its use.

*Laminectomy for Simple Fracture.*—Mortality following this operation has been variously estimated at from thirty to fifty per cent. GALLAUDET, in the *Annals of Surgery*, January, 1897, says that these percentages are misleading, because the cases are not classified as regards the seat of the injury. The prognosis, if the injury is in the lumbar region, is very favorable. It grows less so the higher the injury. He reports three cases operated upon by himself, two in the lumbar region and one in the upper dorsal. The lumbar cases recovered from operation, and are living in an improved condition. The dorsal case died of shock six hours after the operation. The writer urges an immediate laminectomy in all cases of fracture of the lumbar laminae, in which the diagnosis is reasonably clear.

*The Presence of Nerves in New Growths.*—YOUNG (*Journal of Experimental Medicine*, Vol. II., p. 1) has examined a number of malignant and benign tumors, in order to determine the presence therein of nerve fibers.

<sup>1</sup> *Therapeutische Monatshefte*, 1895, ix, 6.

In five of ten cases of carcinoma and sarcoma and myxoma, the presence of nerves was positively demonstrated. In sarcoma, at least, the nerves seem to be as much an integral portion of the tumor substance as the sarcomatous blood-vessels. Their origin in carcinoma was not so clear, and it is possible that those seen were nerves of normal structures which were surrounded by the invading cancer tissue. This is an entirely new subject, and as yet no explanation has been given of the function of nerves in new growths, except the suggestion that they may be vasomotor in character.

**Experiments upon Metabolism Made by the U. S. Department of Agriculture.**—Experiments upon metabolism have frequently been made in Europe, but the first careful investigation of this sort to be carried out in the United States, according to a writer in *Science*, March 26, 1897, has recently been undertaken at Wesleyan University in Connecticut under the auspices of the Department of Agriculture. The apparatus included a so-called respiration chamber 7 x 4 x 6.5 feet, with glass doors, and containing a chair, table, and cot bed. A man can remain in this chamber for an indefinite time without inconvenience. A current of fresh air passes through the box. All food, drink, excretory products, and the currents of air are weighed or measured and chemically analyzed. The duration of the experiments varied from two and a half to twelve days. Certain days were passed in absolute rest, others in hard study, and still others in hard muscular work. Results showed that during the periods of rest the subject gained about half an ounce of protein and lost half an ounce of fat a day. With severe mental work the results were almost exactly the same. During the period of hard muscular work the food which had proved sufficient for the periods of rest and of brain work did not suffice for the needs of the body, and the subject lost daily a sixth of an ounce of protein and seven ounces of fat. The investigations will be continued, and attempts will be made to discover the kinds of food best suited to different kinds of work.

## THERAPEUTIC NOTES.

**Glycero-phosphates in Neurasthenia.**—In the *Bulletin Générale de Thérapeutique*, February 8, 1897, BARDET denies that the glycero-phosphates have any specific action in neurasthenia. He attributes the good results which follow their ingestion to the ease with which they are disintegrated and furnish phosphorus in a ready assimilative form. In certain cases of neuralgia success has followed their use by hypodermic injection, a mode of action which is not well understood.

Glycero-phosphates probably represent the form in which phosphorus exists, not only in the nervous system but also in the nutrient fluids from which the bones draw their phosphates. It is probable, also, that the iron in a blood-corpuscle exists in the form of a glycero-phosphate. The indication for their use exists not only in neurasthenia, but also in diabetes, anemia, scrofula, and rickets.

ROBIN recommends the use of a mixture of the glycero-phosphate of lime 5, soda 1.5, potassium 1.5, magnesium 1.5, and iron .75 grams twice a day.

### For Nervous Hyperacidity of the Stomach:

R Strontium bromid (pure), . . . . . 3 iii  
Aq. menth. pip. . . . . 3 xv  
Sig. Teaspoonful twice daily in milk at mealtime.  
—EINHORN.

### For an Acutely Inflamed Rectum:

R Chloral hydrate, . . . . . grs. xlv to lxxv  
Tannic acid, . . . . . grs. xxiv  
Lime water, . . . . . Oi  
Sig. One-fourth to one-third of this quantity is to be mixed with  $\frac{3}{4}$  xii of warm water or thin starch water, and 5 or 6 ounces injected into the rectum at a time and retained as long as possible.—EWALD.

**The Treatment of Nephritis with Antipyrin.**—MODINOS (*Gas. degli ospedali*, December 20, 1896) says it is not yet determined whether the various forms of nephritis are distinct diseases or variations of the same disease. Though the causes are various, the general conclusion that all cases of true nephritis are due to bacterial infection seems warranted. The multiplicity of remedies employed furnishes the most palpable evidence of the uncertainty that obtains as regards the etiology of the disease. Not one of them—tannin, sodium tannate, gallic acid, salts of lead, potassium iodid, salts of strontium, fuchsin, methylin blue, tincture of cantharides, etc.—has gained the general verdict of possessing any preeminent degree of efficaciousness. In the treatment of the various forms of nephritis we must endeavor above everything to stimulate the action of the kidneys, and, furthermore, to check the development of toxic products, and to neutralize the toxins already evolved.

For accomplishing the first two ends, a milk diet is best suited; for the neutralization of the toxic products contained in the urine, the author recommends antipyrin as the suitable remedy. After many experiments with this drug, he has found it useful in most varieties of nephritis, whether acute or subacute, primary or secondary, and also in nephritis of the postmalarial type. He gives from 12 to 20 grains daily in divided doses. Under this treatment the quantity of albumin in the urine was found to diminish, and, in a remarkably short time, to disappear altogether, together with the symptoms of renal intoxication.

**Soluble Phosphate of Bismuth.**—According to DÖRFLER, LEISER, and SÖHLE (*Gas. Heb. de Méd. et de Chir.*, March 18, 1887) this salt contains twenty per cent. of phosphate of soda. It is very soluble in water, and if injected under the skin of animals it does not produce any injurious or toxic effect. It has a marked astringent and antiseptic action in the intestinal canal. It is recommended in diarrhea of children, in gastralgia, tuberculosis of the small intestine, typhoid fever, and cholera morbus, and in this last infection particularly, it allays vomiting, reduces the number of stools, and favors recovery. The dose is .2 to .5 grams (3 to 8 grains) three times a day.



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## THE DIAGNOSIS AND TREATMENT OF CHOLELITHIASIS.

THIS subject was most admirably discussed at a recent meeting of the New York Academy of Medicine. The five papers which were presented—each one by a person competent to speak with authority upon the particular phase of the subject allotted to him—constituted a most complete and instructive symposium. All of these papers have been presented in the columns of our last two numbers, and the readers of the NEWS are to be congratulated on the opportunity thus afforded them of enjoying this condensed and interesting discussion.

Among the salient points presented was the fact that the diagnosis of gall-stones is frequently obscure and too often overlooked in ascribing the symptoms to other causes. In confirmation of this, many interesting cases were cited by Dr. Peabody, and later by Dr. Draper. In the "Chemistry of Gall-stones," so interestingly presented by Professor Chittenden, while no new facts were developed, the insolubility of the stones *in situ* was demonstrated, as was the absolute futility of any therapeutic efforts directed to that end. Agents that tended to increase the flow and alkalinity of the bile and arouse and maintain peri-

staltic action of the ducts were physiologically indicated. Dr. Thompson held that this could be most satisfactorily accomplished by a carefully regulated diet, appropriate doses of sodium phosphate, and horseback riding. It will thus be seen that the drift of the argument was in favor of preventive measures, all admitting the hopelessness of treatment other than surgical after gall-stones had once formed. How surgical procedures could be rendered safe and effectual in surgery of the gall-bladder and the common duct was presented and enriched from the clinical experience of those masters of surgical art, Gerster and Lange.

In the general discussion which followed, the whole subject was summed up in a masterful way by Dr. Charles McBurney. Regarding the prevention of gall-stones he thought none would suffer who form proper habits of exercise and maintain healthy elimination during the comparatively short period of gall-stone formation. The cases could be divided into two classes: those which should be operated upon and those which should not be operated upon. As a rule we must consider as inoperable those cases in which there are frequent and short attacks, with sudden relief, indicating the passage of small gall-stones, thus demonstrating the probability of obtaining relief in a similar way again. For, as a rule, when a person passed small stones he did not have large ones. On the other hand, when an operation was indicated it should be done promptly before the formation of ulcerated adhesions, or the development of cholemia. As had been pointed out by Dr. Lange, the operative dangers related to cholemia and the tendency to hemorrhage depended thereon. It was to the prevention of these conditions, or the anticipation of them by early operation, that attention should be directed if progress is to be made in the treatment of cholelithiasis. Let the medical practitioner mark well those cases which do not pass their gall-stones as the ones which should be subjected to operation at an early stage.

## THE ADDED POWER OF THE STATE BOARD OF CHARITIES IN RELATION TO MEDICAL DISPENSARIES.

A DECIDED step in advance has been taken by the advocates of reform in the matter of indiscriminate dispensing of medical charity in this State in the bill that has recently passed both houses of the Legisla-

ture, and which now but awaits the signature of the Governor to become a law. This bill provides that all dispensaries, whether of a municipal or private character, shall be subject to the supervision and control of the State Board of Charities, and this body is empowered to "annul the corporation, or suspend the operations, or to revoke the license of any dispensary for wilful neglect or failure on the part of its managers, trustees, officers, or employees to comply with the rules and regulations so established."

Chapter 771 of the Laws of 1895 defined the duties and privileges of the State Charity Commissioners, but power was not given them to close any dispensary which, in their opinion, was not fulfilling the object for which it was founded. For many years an earnest effort has been made toward obtaining the authority embodied in the terms of the present bill, and now that this is all but achieved, it remains to be seen how it will be enforced.

On page 82 of the annual report of the State Board of Charities for the year 1896, which was presented to the Legislature February 25, 1897, in the section devoted to the investigation of the dispensary system, is the following: "During the last twenty-five years these institutions have rapidly increased and the competition has been so great that the question has been raised as to the real value of this method of administering relief. . . . To fulfill its proper mission it [the dispensary] should be so organized and managed that only the really sick poor should be able to secure its benefits. It has been found that managers of dispensaries rarely institute any adequate inquiry into the means or ability of patients to pay for the medical services of the physician or for the medicines which they receive. . . . It is very evident that when any so-called charities have so far departed from their original objects and purposes as to invite, or even allow, persons of wealth or moderate competence to enjoy their benefits, they have ceased to fulfill their proper functions and should be suppressed."

If the present bill becomes a law, it will go into effect on the first day of October, 1897, and as it is an open secret that the governing board of more than one long-established and powerful dispensary in this city is opposed to change in any form of the methods now in force, it is reasonable to assume that influence will be brought to bear in order to modify

or abrogate such rules or regulations as may be promulgated by the Commissioners as to make them practically useless. If this should prove to be the case, and there are many who will eagerly watch the progress of the Commissioners along the rugged road of reform, it may be said without fear of contradiction that the several representative medical societies of the State, and especially the Medical Society of the County of New York and the County Medical Association, will be prepared to exert their influence and invoke such legislative action as will serve to amend and strengthen the law and thus assure to physicians and laymen alike the economic benefits that have been so long withheld.

#### THE ACTUAL DANGER OF AIR EMBOLISM.

For many years, text-books on surgery and surgeons in active practice have taught that the entrance of air into the veins was a most serious accident, followed in a large proportion of instances by death. Some ten years ago the writer, when engaged in making a large number of experiments in which remedies were injected directly into the jugular vein of animals, particularly dogs, noticed that in no instance was the simultaneous entrance of air followed by any particular effects. This led him to undertake researches directed to the elucidation of the question now under discussion. The results of these experiments demonstrated that very large quantities of air could be injected into the vein of a living animal without deleterious influence. Thus 20 c.cm. of air injected into the left jugular vein of a dog weighing forty pounds, produced absolutely no effect whatever save that the respiration was slightly quickened for one minute after the injection, the animal, as soon as it was set free, running about the room as happily as ever. Blood-pressure tracings taken from other animals receiving large quantities of air into their veins showed that its injection influenced very slightly, if at all, the blood pressure and pulse-rate.

A paper, detailing these experiments and giving some of the tracings, was published in the *Therapeutic Gazette* for September, 1889, and studies were also made of the effects produced by injecting air into an artery. Such an injection was always followed by the most serious results, which, according to the teachings of the late Professor Gross, were to be expected. Ordinarily, however, the blood pressure in

the artery is so high that it is impossible for air to enter, except it be deliberately injected, so that, aside from deliberate experiment, the probability of air entering an artery is very remote. In the paper to which I have referred, quite a number of bibliographical references are given, and instances quoted in which the entrance of air into a vein resulted in the death of the animal or the man who received it, but it is a noteworthy fact that the great majority of these researches were made in the early part of the present century and some of them were exceedingly crude. It seems to be an undoubted fact that the entrance of very extraordinary amounts of air is capable of producing death in man and animals, and this we can readily understand, for if the cardiac cavities are entirely filled with air to the almost total exclusion of blood, large quantities of air would be driven into the arteries supplying the vital centers at the base of the brain and produce results identical with those following the injection of air directly into the carotid artery.

On the other hand, it would seem probable that air embolism is only fatal when a small globule of air entering a vein happens to plug an artery supplying a very vital point. Recently, the writer has inadvertently injected a very large globule of air into the median basilic vein of the arm in two men of advanced years, without producing death. Both cases were suffering from toxemia, requiring intravenous saline injections. In both instances there was after the injection a severe rigor, in one case immediately after the air entered the vein, in the other an hour afterward; but this symptom invariably follows the injection of saline solutions when no air is injected.

One of the most exhaustive papers which has been written upon this subject is that by Amussat, who believed that the entrance of air into the vein was an exceedingly fatal accident, but his essay was violently attacked and partly disproved by Velpeau, Gerdy, Blandin, and Mallé, who asserted that the symptoms which Amussat detailed were due to extraneous causes and not to an air embolism. By far the most exhaustive research, however, which has been published, certainly the most exhaustive in this country, is that by Dr. Nicholas Senn, whose investigations also prove that air embolism is not as universally fatal as is commonly believed. It is interesting to note that the writer of this editorial during the reading of a paper

before the Philadelphia County Medical Society upon this topic some eight or nine years ago, injected no less than 40 c.cm. of pure air directly into the jugular vein of two very small dogs without giving them any inconvenience whatever, the dogs running playfully about the room immediately afterward.

The conclusions to be drawn from the researches to which I have referred, are that very large quantities of air must enter a vein to cause death, and that no such quantity is likely to find its way into a vein which has been injured by the knife of the surgeon. It would seem probable, too, that different animals and perhaps different men, have a varying resistance to the effects of air embolism. Monkeys seem to be quite susceptible to it, as are also rabbits, while horses and dogs, according to the results so far published, seem to be comparatively invulnerable. Thus we find that Cormac blew the contents of his chest twice filled into the jugular vein of a horse, before the animal exhibited any signs of uneasiness. Bartholémy has also found that in horses, as much as six litres of air must be introduced intravenously to cause death, and from this fact assumes that a man weighing 136 pounds would have to receive over one and a half pints of air into his vein before a lethal result would be produced.

An examination of the cases which are on record in which the entrance of air into the veins is said to have produced death, reveals the fact that the conclusions in few, if any, of them will stand analysis. Other causes for the sudden demise of the patient have been possibly present, and it is interesting to note how very few cases of this character have been reported since modern methods of observation have been instituted.

The instances in which death has been said to follow the entrance of air into the uterine sinuses are much more frequent, and the *post-mortem* results on record seem to be far more reliable, but even in these cases the occurrence of sudden death and the finding of gas in the uterine sinuses and veins does not by any means prove that the death was due to the entrance of air, for statistics are continually accumulating which tend to show that the finding of air or gas in the venous system or tissues, particularly the tissues of the genito-urinary apparatus, is far more frequently due to the development of the gas by the *bacillus arogeus capsulatus*, so well described by



Welch, than to the direct entrance of ordinary atmospheric air.

If it is possible, as is claimed by some, that small air emboli entering a vein produce instant death, the question arises: How is this death produced? It seems hardly creditable that the globule of air can effectually plug a blood-vessel, since it would naturally adjust itself to the diameter of it and become more and more attenuated as it passes through capillaries of smaller and smaller dimensions.

When it comes to an explanation of the fact that arterial injection of air is followed by death, whereas a venous injection is not, I confess that I am unable to advance even a satisfactory hypothesis, unless it be that the air entering the right side of the heart from the vein is most of it sent through the pulmonary blood-vessels and expired with the rest of the gas therein contained, and that it is only when so large a quantity of air is injected that some of it passes over to the right side of the heart and arterial emboli form that death results.

Some have believed that air embolism results in the development of secondary clot emboli which produce the accidents arising from arterial injections. The other theory that air acts as a poison to the brain and vital centers is scarcely tenable. Whatever results may be obtained in the future in the study of this interesting subject, one thing seems evident, namely, that air embolism is by no means as fatal as has been generally taught, and that while it is to be avoided by every possible precaution, its occurrence is not equivalent to signing the death warrant of the patient.

In conclusion, it is of interest to draw attention to the experiments recently made by McClintock of Detroit, who proved that the injection of so large a quantity as 600 c.cm. of air into the jugular vein of a horse failed to produce death and that fifteen minutes later the enormous quantity of 1200 c.cm. of air was injected without producing fatal results, although there were for a time marked disturbances of respiration. He also found that 1 c.cm. injected into the vein of a rooster produced some dyspnea followed by complete recovery; that a rabbit receiving 20 c.cm. of air into the vein died in a little less than four minutes, but that a guinea-pig, which received more than a cubic centimeter of air, recovered entirely.

These experiments made by McClintock were designed to controvert the assertion of Drs. Seibert and Schwyzer who claimed, about six months ago, that the sudden deaths which had occurred after the injection of diphtheria antitoxin were due to air embolism. Their experiments were made upon guinea-pigs, and the amount of air injected was so enormous in proportion to the size of the guinea-pig as to be far beyond the quantity which could possibly gain access to the body during the injection of diphtheria antitoxin. Thus a guinea-pig, which ordinarily weighs certainly not more than 500 grams, had injected into its jugular veins from 2 to 4 c.cm. of air, a quantity quite sufficient to entirely fill its cardiac cavities. In other words, the quantity of air which they injected into guinea-pigs would be equivalent to about 4 to 6 ounces of air into the vein of a child weighing fifty pounds.

Doubtless in the near future other studies will be made which will throw more light upon this interesting and practical subject, but the writer confesses that having seen air embolism take place in men and in animals without the serious effects usually supposed to occur under such circumstances, he has come to believe that the accident when it occurs is a far less grave event than has been commonly supposed.

H. A. HARE, M.D.

## ECHOES AND NEWS.

*The International Hygienic Congress.*—The meeting of this association, which was advertised to occur at Madrid, Spain, in September next, has been postponed to April, 1898.

*The Stuttering Habit in Germany.*—An item is going the rounds of the daily press which affirms that there are more than one hundred thousand children in the national schools of Germany who stutter.

*Defeat of the Optometry Bill in New York.*—The so-called optometry bill granting opticians the right to refract eyes and fit glasses, which has been before the Legislature, was defeated by a vote of seventy-three to fifty-one.

*Poisoned by Wild Parsnips.*—William Hughes and wife and two sons, an entire family, living near Mifflin, Ind., ate freely of wild parsnips, which were mistaken for sweet anise. The father and one son lived four hours, and the mother and other son died in forty-eight hours. All suffered great agony.

*Hospital Stewards to Organize.*—An organization to be known as the Military and Naval Apothecaries of the State

Service has been started by the hospital stewards attached to the various regiments of militia in New York and Brooklyn. Members of the Hospital Corps of the regular army and navy have been invited to join.

**Dr. Landon Carter Gray.**—The many friends of Dr. Gray will be pleased to know that he has completely recovered from the severe attack of grip from which he has been suffering, and expects to attend the meeting of the Medical Congress in Washington and discharge his duties as chairman of the Executive Committee.

**The Bubonic Plague Subiding.**—The total number of cases of bubonic plague in Bombay up to April 22d was 11,706, and there have been 10,020 deaths from this cause. Many of the inhabitants of Bombay are now returning to the city. The serum treatment of the disease has not met with the success that was expected.

**The Chemistry and Pathology of Gout.**—Dr. Luff, in his Goulstonian Lectures, delivered recently before the Royal College of Physicians in London, endeavored to establish the important deduction that the opposed qualities of meat and vegetable diets in respect to the induction of gout are due not to their proteid constituents as formerly believed, but to their inorganic salts.

**Sir Andrew Clark's Biography.**—A life of Sir Andrew Clark is to be added to the biographies of the year. Medical attendant to so many noted men, distinguished writers among them, it was thought that he must have left many interesting reminiscences. But it appears that he kept no journal, and that most of his notes on men and opinions are to be found on the margins of the books he read.

**A Negro Woman as an M.D.**—The Louisiana State Board of Medical Examiners has given a diploma to practise medicine to Mrs. Emma Wakefield, a negro woman. She is said to be the first woman of her race in the South, or, indeed, in the Union, to receive this honor. She is a daughter of ex-Senator Wakefield, and a graduate of the medical department of the New Orleans Colored University.

**Increased Requirements in Medical Schools.**—The Northwestern University Medical School of Chicago, otherwise known as the Chicago Medical College, has increased its requirements for admission to a standard equivalent to the requirements of the best literary colleges. Every applicant for admission must either present a diploma from some acceptable school or college, or sustain the examination.

**A Chair of Vertebrate Paleontology.**—The will of Edward Drinker Cope, professor of zoology and comparative anatomy in the University of Pennsylvania, has been admitted to probate in Philadelphia. He bequeaths the bulk of his estate, estimated at \$100,000, to the University of Pennsylvania, and provides for the establishment of a chair of vertebrate paleontology in the Philadelphia Academy of Natural Sciences.

**New York School Inspectors.**—The weekly reports of these officers emphasize constantly the importance of their work.

The last report shows that there were 3918 children examined. The total number excluded was 258. There were 7 cases of measles, 5 diphtheria, 1 scarlet fever, 1 croup, 2 whooping cough, 12 mumps, 31 contagious eye diseases, 169 parasitic diseases of the head, 9 of the body, 11 chickenpox, and 10 skin diseases found.

**Trouble Among the Apothecaries of Chicago.**—It is reported that a Chicago druggist has been condemned by a jury to pay \$1500 damages for the mistake of a prescription clerk, who used carbolic acid in a lotion for inflamed eyelids, and destroyed the sight of one of the eyes of a little child. Another druggist of the same city fares worse, a verdict for \$8000 being given against him, because one of his clerks sold corrosive sublimate for calomel.

**Report of the New York State Lunacy Commission.**—The annual report of the State Lunacy Commission for the year ending September 30, 1896, recently presented to the Legislature, gives the whole number of registered insane on that date as 20,869, a net increase of 653 over the preceding year. The total amount expended for maintenance was \$3,052,952.87; and the expenditure for new buildings, repairs, and improvements was \$829,466.43.

**Fire at the Woman's Medical College of New York.**—The college portion of the buildings of the New York Infirmary for Women and Children, East Fifteenth street and Livingston Place, was destroyed by fire April 22d. The Woman's Medical College thus ruined was the only regular school of medicine for women in this State, and it had over one hundred students. The infirmary was founded in 1854 by Drs. Elizabeth and Emily Blackwell. The ruined building was erected by private gifts at a cost of \$125,000.

**The Bacterium of Mumps.**—It is reported from Berlin by the correspondent of the *British Medical Journal*, that Professor Von Leyden has discovered a new diplococcus in the parotid gland secretions of persons suffering from mumps, which he takes to be the "mumps bacterium." It is distinct in appearance, and can be cultivated on the usual media. Attempts to inoculate animals proved unsuccessful. The diplococcus has been found, not only in the parotid gland secretion, but also in the pus of the inflamed gland.

**The Queen's Jubilee in Edinburgh.**—The citizens of Edinburgh, Scotland, are considering how to commemorate Her Majesty's long reign. Three suggestions have been made: (1) The building of a consumption hospital; (2) an extension of the Queen's Jubilee Nurses' Institute; and (3) the building of a pavilion to the Royal Infirmary for the Diseases of Women. The first-named scheme is the most needed and decidedly the most popular, 509 persons having died from phthisis pulmonalis during the year, and 320 from all other infectious diseases.

**A Case of Yellow Fever at New York Quarantine.**—Otis E. Bullock of Haverhill, Mass., twenty-one years old, a passenger on the steamship "Finance," which arrived April 22d from Colon, was removed, on the vessel's arrival at

quarantine, to Swinburne Island, suffering from yellow fever of a most malignant type. He died soon afterward. He had been sick for several days, and had been attended by the ship's physician, but grew steadily worse. He had been a student of natural history for several years, and a few months ago joined the Frank Blake Webster company's expedition of naturalists to South America, and was on his way home.

**The Semi-Centennial Meeting of the American Medical Association.**—The semi-centennial meeting of the American Medical Association, which will be held in Philadelphia on the 1st, 2d, 3d, and 4th of June, 1897, bids fair to surpass in the character of the entertainment, the scientific papers, and the number in attendance any meeting which has heretofore been held. The committee in charge have been able to obtain large and roomy places of meeting for the general meetings and the section meetings all within a single block and within very short-walking distance, or immediately adjacent to the largest and most comfortable of the Philadelphia hotels. For the week preceding and following the meeting the Committee of Arrangements have also arranged for clinical courses, which will be open without charge to all physicians who may visit the city at that time.

**Reduction in Steamship and Railway Rates to Moscow.**—Reduction of fares for those who intend to visit the Twelfth International Medical Congress will be as follows: On French, Spanish, Norwegian, and Oriental railroads fifty per cent. On Italian railroads thirty to fifty per cent., according to distances. On Norwegian railroads a second-class ticket is valid for the first-class; a third-class ticket for the second. On the steamers of the Compagnie Générale Transatlantique, from New York to Havre, "the minimum summer rates" are charged; on its Mediterranean line fifty per cent., and on the West Indian thirty per cent. are deducted. The "Messageries Maritimes" allow thirty per cent.; the Italian line of the Mediterranean, thirty per cent.; the Constantinople-Odessa line, fifty per cent.; the Austrian Lloyd, twenty-five per cent.

**A Successful Surgical Operation upon the Heart.**—It is reported from Berlin that Dr. Rehe of Franfort presented a patient before the Surgical Congress, recently held in Berlin, upon whom he had operated for a lacerated wound of the heart, the first case of the kind in the history of surgery. In reporting the case, Dr. Rehe said that the man had been stabbed in the heart. In the ordinary course his death would have been certain in a very short time. He was, however, hurriedly conveyed to the hospital, where Dr. Rehe was in attendance. The doctor had him at once taken to the operating-room, where he laid bare the heart and found that there was a wound on the right side of the organ. He sewed up the wound and applied general treatment for arresting the hemorrhage. The heart worked violently during the operation, but despite the commotion of the organ the patient made good progress and soon recovered.

**Obituary.**—Dr. Le Roy McLean died at his home in Troy, New York, April 23d. Dr. McLean was born at

Jackson, Washington county, February 12, 1831. He was of sturdy Scotch descent. He commenced the study of medicine in 1851, and graduated from the Albany Medical College with the class of 1855. He was the first in his immediate section to perform the operation of ovariectomy, in which branch he gained a high reputation, and the first in this country to open the esophagus in order to remove foreign bodies. The latter fact was noted throughout the surgical world. He performed the first successful hip-joint amputation in the war of the rebellion. Dr. McLean was a member of the American Medical Association, New York State Medical Society, the American Surgical Society, Rensselaer County Medical Society, honorary member of the New York State Association of Railway Surgeons.—Dr. Frank Abbott, Dean of the New York College of Dentistry, and a well-known physician, died suddenly April 20th, of heart disease, at his residence in New York. Dr. Abbott was born at Shapleigh, Me., September 5, 1836. His ancestors came to America in 1640, and settled in Andover, Mass. After taking his degree he removed to Johnstown, N. Y., and practised dentistry continuously there, except for the time spent in the army during the late war, until 1863. A year later Dr. Abbott removed to New York City, and took a course in medicine at the University of the City of New York. He graduated as a physician, and immediately afterward organized the College of Dentistry, to which, one year later, he added an infirmary. Of this institution he was made Superintendent in 1869. He was the author of many valuable treatises on dental and medicinal subjects, and was a member of several scientific and literary societies. He was an enthusiastic collector of rare prints relating to American history, and is said to have possessed the finest collection of its kind in this country.

## CORRESPONDENCE.

### AN UNUSUAL COMPLICATION OF EMPYEMA.

To the Editor of the MEDICAL NEWS.

DEAR SIR: I send you, herewith, the report of a case of empyema, following pleuropneumonia, which presented an unusual complication causing death.

Mrs. S., aged twenty-six. Family history negative. Previous health good. I first saw the patient January 20, 1897, in consultation. She had been ill for five weeks. I found her with a temperature of 101° F.; pulse, 140, and respiration, 48. The physical examination showed the right lung to be collapsed, with a considerable amount of fluid in the pleural cavity. There was a slight hypostatic involvement of the base of the left lung. The patient was coughing almost constantly, and expectorating pus by the mouthful, that smelled strongly of sulphuretted hydrogen. An exploratory puncture in the sixth intercostal space was made with an aspirating needle, and a pint of pus evacuated. This was followed by temporary relief of the cough. The diagnosis was empyema with perforation of the lung. An operation was advised, and the patient was brought to the hospital in a state of collapse. By means of oxygen inhalations and strychnin, administered hypodermatic-



ally, she rallied so that her condition was about the same as when I first saw her. Not deeming general anesthesia safe under the circumstances, I used the infiltration method. A free opening into the pleural cavity was made in the track of the previous needle puncture, from which pus was beginning to be discharged. Two drainage tubes were introduced, and the cavity drained freely. The next morning the temperature was normal, pulse 108, and respiration 32. The patient did well for forty-eight hours, when the temperature again became elevated, and the discharge from the wound was enormous, although it had lost its odor of sulphuretted hydrogen. In the discharge were many large coagula, resembling curdled milk in odor and appearance; so that a fistulous communication with the digestive tract was evident. A charcoal tablet was administered as a test, and the next morning it was washed from the pleural cavity. The patient died twelve days after the operation from starvation, not having been able to retain nutritive enemata, and nearly, if not all, nourishment given by mouth passing from the wound.

*Autopsy.*—Right lung completely collapsed, with numerous bands of adhesion between it and the chest wall. The pleural sac contained about twenty ounces of pus, mixed with food. The surface of the visceral pleura showed several sinuses leading into the lung tissue. At the nipple line was a point where the pleural covering of the lung was broken down, and a hernia of semidisintegrated lung tissue protruding. The stomach was opened, and water introduced by means of a fountain syringe was speedily discharged from the point above mentioned. Further dissection revealed a perforation through the lung into the side of the esophagus. The opening was circular and about one-third of an inch in diameter.

The left lung was adherent to the chest-wall over nearly the whole of its surface, and posteriorly showed signs of a beginning encysted empyema.

Very truly yours,

EDWARD B. PATTERSON, M.D.

MANISTIQUE, MICH, March 14, 1897.

### OUR PHILADELPHIA LETTER.

[From our Special Correspondent.]

**PATHOLOGICAL SOCIETY MEETING—THE COLLEGE OF PHYSICIANS' MEMORIAL TO THE SENATE—THE GROSS STATUE—KINGS COUNTY HOSPITAL APPOINTMENTS—THE WALTER GARRETT MEMORIAL BUILDING.**

PHILADELPHIA, April 24, 1897.

THE Annual Conversational Meeting of the Pathological Society of Philadelphia was held on the evening of April 22d. Dr. Ludvig Hektoen of Rush Medical College, Chicago, delivered an address on "Segmentation and Fragmentation of the Myocardium." Dr. Hektoen expressed his belief that fragmentation and segmentation are two distinct processes, and that probably they occur independently, the former resulting from a loss of the intercellular cement substance of the muscular fibers. He also thinks that this lesion, which has been studied by himself and by others under varied circumstances, is

capable of causing a fatal termination, and that it is the actual cause of sudden death in many instances in which there exists no demonstrable lesion. In his opinion, the capillaries of the heart, described by Meigs, are really instances of segmentation and fragmentation. Following Dr. Hektoen's address, he was tendered a reception by the Society at the University Club.

The College of Physicians is about to present to the United States Senate a memorial praying for the retention in the new Dingley tariff bill of the present law relating to the free entry into this country of books, instruments, specimens, and apparatus intended for institutions of learning. The College, with its magnificent library of over sixty thousand volumes, and its museum of pathology and surgery, fears that its usefulness will be greatly crippled should the existing law be altered.

The unveiling of the Gross statue in Washington on the fifth of next May will be an event of especial moment to the medical men of Philadelphia, and particularly to the alumni of the Jefferson Medical College, who have accomplished so much toward securing a fitting memorial to this once-distinguished member of their faculty. The trustees, faculty, and many of the alumni of this institution have arranged for a special train for the trip to the Capital on this occasion. The Secretaries of the Treasury and Navy have accepted invitations to be present at the ceremony, and it is hoped that the President will make an address. Letters from many European surgeons have been received by the secretary in charge of the proceedings, regretting their inability to be present, and expressing their highest appreciation of the services rendered to surgery by Dr. Gross. The ceremonies will be opened by a prayer by the Rev. B. L. Whitman, D.D., President of Columbian University, Washington, D.C.; the presentation of the statue is to be made by Dr. C. H. Mastin of Mobile, who initiated the movement of erecting the present memorial; the unveiling will be performed by a granddaughter of Dr. Gross, Miss Adèle Horwitz; Surgeon-General George M. Sternberg, U. S. A., will receive the statue on the part of the Government, and Dr. W. W. Keen of Philadelphia, the successor to Dr. Gross' chair in the Jefferson Medical College, will deliver an address. The statue, which is considered by those who enjoyed Dr. Gross' acquaintanceship an admirable likeness, is the work of A. Sterling Calder, a young Philadelphia sculptor of great talent.

That New York should look to her laurels is the inference drawn from the result of the recent competitive examination for resident physicians at the Kings County Hospital, Brooklyn, at which the first, third, and eighth places were won by graduates of the Jefferson Medical College. Out of a total of fifty-two applicants for the vacancies there were fifteen from Philadelphia, eight of whom were from the above-named school.

The latest addition to the group of new buildings which have been erected by the Pennsylvania Hospital during the past few years was formally opened on April 23d, with the dedication of the Walter Garrett Memorial Building. The President of the Board of Managers of the Hospital, Benjamin H. Shoemaker, presided at the exer-

cises, and made a brief introductory speech. Dr. Thomas G. Morton, for many years a surgeon to the hospital, described the building and its uses, and gave an interesting review of the modern status of surgery. Dr. J. M. Da Costa, a member of the medical staff, paid a high tribute to the former physicians to the hospital, and mentioned in particular the special abilities of many. Dr. John B. Chapin, Physician-in-Chief of the Insane Department of the Pennsylvania Hospital, spoke of the development of this branch of the institution, and described the work of which he has charge. The ceremonies concluded with an inspection of the new building, after which a lunch was served to the visitors.

### OUR VIENNA LETTER.

[From our Special Correspondent.]

EASTER VACATIONS IN VIENNA—FREQUENT HOLIDAYS IN THE AUSTRIAN UNIVERSITY—THE FIRST WOMAN TO RECEIVE A DOCTOR'S DEGREE FROM THE IMPERIAL AUSTRIAN UNIVERSITY—AMERICAN WOMEN MEDICAL STUDENTS IN VIENNA—CONSERVATISM IN APENDICITIS.

VIENNA, April 7, 1897.

THINGS medical here in Vienna are very quiet just now. At the University the usual vacation between the winter and summer semesters is in progress, and professors are either away on a holiday or preparing quietly for the work of the next session. To an American, the occurrence of a six-weeks' vacation in the midst of the year's work seems, at first glance, to be utterly inadvisable. For us, of course, it would not answer, since it would involve the continuance of the work during the warm months. Here, however, where the heat is not a special source of inconvenience, at least not until late in July, the vacation must be a welcome break in the monotony of the ordinary routine. Holidays generally are much more frequent during the scholastic year here than they are in America. This seems to be the case not so much from deliberate forethought on the part of the University authorities as from the following of long-established usage in the matter; but one cannot help thinking that the system has its advantages. Intellectual work of a solid character is much better accomplished when broken by periods of complete relaxation than when the mental tension is maintained continuously for months at a time. It does not suit our impatient American ways, however, and not a little complaint is heard from American students here at the frequent, and what they consider unnecessary, loss of precious time.

Friday, April 2d, was, in the words of the *Rector magnificus* of the University of Vienna, "a day of special significance for the University, since on it occurred the giving of the first doctor's degree that our old and revered *alma mater* has ever conferred upon a woman." The degree was the Doctorate in Medicine, and the recipient was Gabrielle Possaner von Ehrenthal. The event marks an era in university education in Austria, and probably means the extension, in the near future, of all the Imperial University privileges to women. Considering the difficulties he had to overcome, the new sister in the profession

thoroughly deserves the congratulations that she has received from all sides. She is a member of a noble Austrian family, and after preparatory studies here she continued her medical course in Zurich, as the University of Vienna was not open to her. After taking her degree, some four years ago, she applied for permission to practice in Austria, but was told that for that she must have an Austrian degree. This, of course, seemed impossible. Finally, however, she was granted governmental permission to practice in a part of the empire adjoining Turkey, and where the presence of a considerable number of Mohammedans would make her work somewhat that of a medical missionary among the unfortunate Turkish women. This privilege, as might have been expected under the circumstances, was not very highly appreciated, and her case was presented by influential friends to the Emperor himself. The well-known loyalty of her family and her own well-proven merits were enough to outweigh even the solid conservatism of Austrian institutions, and at the Emperor's request, after the usual examinations, the Austrian University's doctor's degree was granted. Coming in this way, one might have expected that the degree would have been conferred without any special *clat*; but students and faculty were in heartiest accord in expressing the most cordial sentiments of welcome to the first sister, it had been their privilege to greet.

The *Rector magnificus*, Professor Reinisch, after congratulating her on "the great energy and intelligence she had displayed in overcoming the obstacles that were in her path," said that he "was proud to hail her as the first victor in the contest for woman's intellectual rights in her native country." He added: "Man may think as they will of this important question of woman's rights, but every thoughtful and unprejudiced mind must admit that the broadening of the intellectual field of view of women will inevitably elevate the intellectual and moral standard of the whole race. We would commit a serious sin against progress if we were to confine such women as have distinguished themselves by their moral and intellectual power to the kitchen and to the nursery. It is to be hoped that what one woman receives now as a special favor will in the very near future be open to all women as a right. Wonderfully impressive words are these from a rector of the University of Vienna. They are an earnest of the time, not far distant now, when intellectual culture, whether for its own sake, or for any humane or utilitarian purpose, will nowhere be considered as the special privilege of one sex to the exclusion of the other.

The rector's address was received by the students present with impressive cheers ("Prosit-Rufen!"), and when the graduation exercises were over, and the newly "promoted" doctor surrounded by friends left the hall sometime after the other candidates, she was received by the students gathered in the corridors with the most cordial cheers and cries of "prosit!"

Despite the fact that women are not admitted to university courses in Vienna American women doctors have for fifteen or twenty years found it well worth their while to come here for advanced work. Not every opportunity that they might wish has been open to them, but their own sterling

common sense, their readiness to work, their general appreciation of what was done for them, and, one must add, their thorough intellectual qualities, added more and more to their opportunities until now there is scarcely any privilege that they cannot have for the asking. Conservatism still has its hold, however, and to some of the professor courses not even American doctoreses have been able to gain an entrance. It has not been because they have not tried hard enough, though. One wonders now whether after this graceful bow of the University authorities to the Imperial wishes this remaining exclusiveness will not finally vanish.

One of the striking things about attendance on surgical clinics in Vienna is the comparative absence of operations for appendicitis. In a large general hospital, where a number of cases are operated on each day in America, one would surely see appendicitis operations quite frequently. I venture to say that at none of our post-graduate schools, at least, does a week pass without an occasion being afforded to demonstrate that very fashionable procedure. At first one is inclined to welcome with unalloyed pleasure this failure to fall into line and to bless the thorough-going conservatism of the great surgical school that protects it from being carried away by the fancy of the hour. But the medal has its reverse, and the autopsy-room makes some impressive revelations. After one has seen on the *post-mortem* table some cases of perityphlitic abscess from ruptured appendices, with liver abscess from spread of infectious micro-organisms along the portal veins, and even abscesses of the lungs from further spread of the infecting material, one does not feel so kindly toward conservatism. Such cases must be extremely rare in America now, but here one is assured that they are often seen. Usually, of course, these patients come to the hospital in an inoperable condition, with the process so far advanced owing to medical neglect that surgical interference is not deemed advisable, but it is a cause for congratulation that the veriest country practitioner in America would not now allow a case to progress this far without rendering surgical assistance. Conservatism is all very well in its place, but when it comes to leaving untouched a collection of pus, the outlines of which can be easily traced on the abdominal walls beneath the edematous tissues that betray its presence, until it has infected other important organs, then it ceases to be a virtue. American surgeons may go too far in their enthusiasm to remove appendices, but that is surely not as bad as leaving them alone in the medieval style in vogue here.

#### TRANSACTIONS OF FOREIGN SOCIETIES.

##### Paris.

CASE OF TYPHOID FEVER FOLLOWING INGESTION OF OYSTERS—URETERO-PYELONEOSTOMY IN A PATIENT SUFFERING FROM HYDRONEPHROSIS—MASSAGE FOR FRACTURE OF THE CLAVICLE—TREATMENT OF A HYDATID CYST OF THE LIVER BY RESECTION OF THE INFERIOR BORDER OF THE THORAX—ACUTE ANGIOCHOLECYSTITIS CAUSED BY COLI BACILLUS, ETC.

AT the session of the Academy of Medicine held March

16th, CHATIN mentioned a case of *typhoid fever following the ingestion of oysters*. Investigation of the circumstances connected with the case revealed the fact that the oysters were grown in beds which were contaminated by the sewage of a large city. Several persons were made sick from eating these oysters, but only one died. In this instance, as well as in many similar ones which have been reported elsewhere, there was the grossest neglect of all precautions to produce healthy oysters. There is little danger of infection from oysters even when grown in unhealthy places if they are placed in pure sea water for a week before they are eaten. The sea water hinders the development of the typhoid bacillus and increases the resisting power of the bivalve.

At the session of March 30th, MONOD reported a case of *uretero-pyeloneostomy* performed by Bazy in a *patient suffering from hydronephrosis* due to defective opening of the ureter into the pelvis of the kidney. A free incision was made, the fluid evacuated, and the ureter divided and implanted low down in the pelvis of the kidney, so as to favor the escape of urine. Similar operations have already been performed a few times, and the tendency at present is to substitute some such plastic operation for nephrectomy in cases of hydronephrosis.

At the session of April 6th, LUCAS-CHAMPIONNIÈRE showed four patients who had been treated by *massage for fractures of the clavical* occurring thirteen, fifteen, eighteen, and nineteen days previously. In no case was there any pain, and the patients were able to move their arms in any direction.

PEAN said that massage was advisable in many fractures, but that it cannot take the place of the present methods of treatment in all cases; and that all the four patients presented a slight degree of projection and overlapping of the fragments, which would be very objectionable in the case of a woman.

CHIPAULT has treated seven patients suffering from perforating ulcer by stretching the plantar nerves, with but a single failure. In five cases both the internal and external plantar was stretched. Every effort should be made to cleanse the ulcer thoroughly by curettage, etc., and primary union of the wound, made for stretching the nerve, should be secured if possible.

In the Surgical Society, March 17th, RICHELOT describes a case of *peritonitis occurring in a girl aged 9 1-2 years as a result of a fall upon the stomach*. Four weeks later puncture of the abdomen produced 1.5 liters (three pints) of pus, and median laparotomy was performed. The bladder, which was adherent to the abdominal wall, was opened, but immediately closed by fine silk sutures, and three liters (six pints) of the thick pus, containing fibrinous masses, was removed from the abdominal cavity. The peritoneal cavity was washed out with a 1-10,000 bichlorid solution. The cul-de-sac of Douglas was tamponed with salol gauze by Mikulicz's method. A drain was also placed in each iliac fossa. The patient recovered.

RICHELOT objects to the use of the term "general peritonitis" in such a case as this for the pus was confined in the lower abdomen. Cultures of the pus, as well as



inoculations, were negative, but the idea prevailed that the case was one of tuberculous peritonitis set up by the accident. He criticised the use of bichlorid solution for irrigation, and considered pelvic drainage better than the tamponing with gauze by the Mikulicz's method. Quéne and Reynzer were in accord with Richelot's opinion. Brun believed the case to be one of peritonitis, produced by a pneumococcus.

MONOD described *the treatment of a hydatid cyst of the liver by the resection of the inferior border of the thorax*, according to the method of Lannelongue. Incision was made through the eighth, ninth, and tenth costal cartilages, and by this means the superior surface of the liver was rendered easily accessible, even to its posterior border. By experiments made upon the cadaver, Monod determined that it is possible to resect the anterior and inferior portion of the thorax without touching the pleura. Beginning with the seventh costal cartilage, close to the sternum, one follows a line obliquely downward and outward to the chondrocostal articulations of the ninth and tenth ribs, and terminating about an inch behind the anterior extremity of the eleventh rib. If the incision be made exactly as described, the pleura will not be injured, and the convex surface of the liver will be fully exposed.

LEJARS presented a patient upon whom he had performed cholecystostomy for an *acute angiocholecystitis produced by the coli bacillus*. The symptoms presented were those of jaundice, acute pain, vomiting, and intense fever, without morning remission. The stools were scanty and pale. Bacteriologic examination of the fluid from the biliary fistula made the day of the operation gave almost pure cultures of coli bacilli. One month later the fluid from the fistula still contained only this one microbe.

At the session of the Medical Society of the Hospitals, held March 19th, MERKLEN mentioned *three cases of appendicitis occurring in the course of an attack of the grippe*. This is not a special form of appendicitis, and has no peculiar clinical features. The grippe, in fact, is no more than a predisposing cause which, by heightening the virulence of the germs normally found in the intestines, leads to an attack of appendicitis. In the three cases observed, recovery followed without surgical interference.

RENDU called attention to the difficulty of making a diagnosis of *appendicitis in hysterical subjects*. In two cases within his knowledge excessive and long-continued pain rendered the diagnosis of appendicitis almost imperative, but the physical examination was most unsatisfactory. In both cases removal of the appendix was followed by complete and lasting recovery, although the organ was only slightly congested.

Rendu thought that the pains caused by a low grade of intestinal inflammation were magnified in these cases by the hysterical nature of the patient.

TALAMON was unwilling to accept this explanation for all hysterical cases. He thought they should be placed in two classes, in one of which hysteria is the sole cause of the symptoms, and to which the name of *hysterical pseudo-*

*appendicitis* should be applied; the other class of cases includes the two mentioned by Rendu, and should be known as appendicitis with hysterical peritoneal symptoms. In these cases, which often simulate tuberculous peritonitis, the existence of painful crises, the alternation of diarrhea and constipation, frequent vomiting, and sometimes a daily rise of temperature, renders the diagnosis extremely difficult.

At the session of April 2d MEUNIER presented the case of a child, aged eight years, who was admitted to the hospital with the obvious signs of acute tuberculosis. A few days later rose-colored spots appeared, the temperature, in the meantime, presenting the usual characteristics of typhoid fever. In spite of the absence of all intestinal phenomena, typhoid fever was suspected, and serum diagnosis was therefore resorted to on several occasions, invariably with positive results.

The autopsy showed the existence of typical miliary tuberculosis, the characteristic granules being found in the lungs, pleura, meninges, etc. The intestine was the seat of small ulcers, presenting all the characters of tubercular ulcers of the lenticular type, with gray granulations on the peritoneal envelope. Histologic examinations indicated that these were really tuberculous lesions, the walls of the ulcers swarming with Koch's bacilli. On the other hand, bacteriologic examination proved that the agglutination observed during life was the result of the presence of Eberth's bacillus, which was found in cultures in the splenic pulp and in the pulmonary and pleural liquids. There consequently could be no doubt of the typhoid infection, as indicated by the temperature curve, the eruption, and the result of the serum diagnosis, though it was completely overshadowed by the evolution of acute phthisis.

At the session of the Therapeutical Society, held March 24th, BARDET read a paper on the treatment of chlorosis and anemia, in which he stated that the therapeutic value of iron varies according to the preparation employed and the special condition of the patient. Everything depends on the absorption which itself is dependent on the digestion; and as digestion is an extremely complicated chemico-phenomenon, varying with each individual, it naturally follows that a given preparation may be valuable in one case and worthless in another. Dujardin-Beaumetz employed by preference those preparations of iron which most closely resemble the iron found in the body, hemoglobin among others. These preparations are well borne by the stomach, and ingestion is the only rational method by which to administer them. Iron glycerophosphate appears to be a very good preparation, but it does not keep well. This difficulty may be overcome by giving a preparation of iron concurrently with calcium glycerophosphate.

ROBIN said that the examination of the chemistry of the metabolic changes in anemia leads to a division of these cases into two classes. The first and more important of these comprises anemic patients with diminution of the nitrogenous changes and oxidation. The second group includes anemic subjects in whom the oxidation and the nitrogenous changes are increased. Iron increases

the oxidation to a marked degree, while arsenic, on the contrary, exerts a powerful moderating influence on this process. The indications for the use of one of these drugs are consequently exactly the opposite of those for the use of the other.

DALCHE reported a case of slightly albuminuric diabetes, in which four hypodermic injections of one gram (fifteen grains) of caffeine in twenty-four hours produced serious cerebral disturbances, excitement, delirium, etc. In the absence of other plausible explanation, it must be assumed that the patient possessed a special idiosyncrasy for the drug.

LE GENDRE called attention to the fact that small doses of caffeine, or even of black coffee, may cause disturbances of this kind.

## SOCIETY PROCEEDINGS.

### NEW YORK NEUROLOGICAL SOCIETY.

*Stated Meeting held April 6, 1897.*

THE President, B. SACHS, M.D., in the Chair.

#### THE STATE OF THE REFLEXES IN SUPRALUMBAR LESION OF THE CORD.

DR. JOSEPH FRAENKEL, read a paper on this subject. He said that it was a general clinical rule that interference with the conduction of the spinal cord leads to an increase in the reflex activity of the centers in the cord below the lesion. The following illustrative cases were cited:

CASE I.—A patient, sixty years of age, entered the Montefiore Home fourteen months after the onset of paralysis of the lower extremities. During the first six months he suffered from sharp darting pains in the lower extremities. Extensive bedsores developed during the last four months of life. The examination showed total motor and sensory paraplegia. There was no tenderness over the spinous processes, and no localized atrophy. The autopsy revealed caries of the bodies of the eighth and ninth dorsal vertebrae, with great thickening of the dura at this level, and with adhesions to the vertebrae for about three inches. The cord was markedly softened, and the microscope showed extensive changes, mainly of the nature of myelomalacia. Above the lesion there was secondary degeneration of the columns of Goll; below the lesion, secondary degeneration of the pyramidal tracts. The process was probably tuberculous.

CASE II.—A woman, twenty-one years of age, entered the hospital on account of transverse myelitis. The disease had developed without assignable cause nine months previously, but she had not sought relief until the involvement of the bladder. Six months after the appearance of the first symptom, she was completely paraplegic. The examination showed marked anemia, a temperature of 102° F., and an extensive bed sore over the sacrum. There was no atrophy; the lower extremities were decidedly tender, and were flexed at the hips and knees. There was total motor and sensory paralysis of the lower extremities, and loss of reflex activity, yet on tickling the soles of the feet they were drawn up. The autopsy showed a fistula at the level of the eighth dorsal vertebra leading into the

spinal canal, and a very vascular sarcoma the size of a cherry, which had pressed upon and softened the tenth and eleventh dorsal segments. The microscope showed that some healthy fibers kept up the continuity of the cord.

CASE III.—The patient was forty years of age, and had a good personal and family history. Up to two weeks before admission his disease showed the familiar symptoms of marked pulmonary tuberculosis. At this time, the spinal cord became involved in the process. The examination showed the temperature to be 101° F. There was an extensive tuberculous process in each lung, and the spinal cord was tender from the lower dorsal region downward. The patient was greatly emaciated, but there was no localized atrophy. The gait was uncertain, apparently due to imperfect coordination. There were numerous areas of anesthesia and analgesia. All superficial reflexes were present, but somewhat diminished. Fairly good contraction of the quadriceps tendon could be felt on tapping the tendon, but it evoked no locomotion. Five days after admission, motor paralysis was found to be more extensive, and the bladder was beginning to be involved. The patellar reflex was much diminished. Shortly after this the patellar reflex disappeared altogether, and a bed sore developed. The *post-mortem* showed advanced tuberculosis in both lungs, and a pachymeningitis extending from the seventh to the tenth dorsal segments. The cord was very much softened in this region, and the microscope showed a fair number of healthy fibers. The lumbar cord was normal.

CASE IV.—This was in a boy whose trouble had developed immediately after a severe fall. On admission, the extremities presented a peculiar swollen appearance, and pitted slightly on deep pressure. There was a large bed sore over the sacrum. The temperature was 103° F., respirations were abdominal, the urine contained considerable albumin, the pupils were unequal, and the abdomen was very tympanic. There was hyperesthesia in the upper part of the trunk, and total anesthesia below. The temperature sense was perverted. The muscles were in a state of complete flaccidity. There was total motor and sensory paralysis. When the soles of the feet were tickled the limbs were drawn up. At the autopsy the sixth, seventh, and eighth dorsal segments were found to be replaced by a fibrous band.

The foregoing cases, Dr. Fraenkel said, showed that occasionally lesions of the cord above the lumbar region did not cause loss of the reflexes. He had found reports of ninety new cases, representing a variety of pathologic conditions, distributed in widely different parts of the cord. In the old cases there was absolute loss of motility. When the continuity of the cord is completely interrupted this can be easily understood, but not so when the interruption is only partial. It seemed reasonable to infer that the motor fibers were always the first ones to suffer in a pathologic process. Sensibility was absolutely lost in all cases where section of the cord was complete. The fibers which served to conduct deep sensibility seemed to have a more specialized function, and were probably the ones most prone to suffer, next to the motor fibers, when the



cord was subjected to pressure. In nearly every case it was stated that the sphincters were paralyzed. In fifty-one reported cases, and in one of his own, there was total destruction of the continuity of the cord, and in all the lesions were such as to indicate serious injury to the cord. In his opinion, Bastion's theory seemed to have met with the most general acceptance. The exact nature of the knee phenomenon was not definitely known. We know positively that the influence exerted by a higher center can inhibit the reflex, and it seemed reasonable that this superior influence should run in an arc. The centripetal branch of this arc exists in some of the ascending columns of the cord to which no definite function had yet been allotted. It should be remembered that loss of the knee-jerk in supralumbar lesions was not necessarily a matter of importance in prognosis.

DR. M. ALLEN STARR said that he had just been reading a paper, by Kocher of Berne, covering to some extent the same ground. He reported seventy cases of transverse lesion of the cord, and made very positive statements to the effect that loss of the knee-jerk is absolutely diagnostic of total ablation of the continuity of the cord above the lumbar region. Many neurologists doubt the validity of the above proposition, and hence the paper just presented is particularly timely. Bastien's statements have provoked criticism from many quarters. This paper admits the possibility of a transverse lesion in some cases causing exaggeration, and in other cases, a loss of reflexes. While this might not satisfy our theories, it is an important contribution of facts.

DR. ONUF said that Dr. Fraenkel had called attention to the rôle played by the cerebellum in the production of the knee-jerk. We know, further, that the pyramidal tracts have an inhibitory influence on the knee-jerk. He desired to advance a theory in this connection. We have not been able to explain many physiologic facts except by assuming the influence of so-called inhibition. One important example of this was to be found in the pyramidal tracts, particularly in those fibers passing from the cortex directly to the anterior horn cells. So far as he knew, no one had tried to supply an anatomic basis for inhibition in order to explain the occurrence of excitation in one case, and inhibition in another. Dr. Onuf said that he assumed that when a current from a cell passes from the protoplasmic process toward the nerve process, or from the cell-body to the nerve process, excitation of the cell results. If, on the contrary, the current passes from the axis cylinder or nerve process towards the cell body, inhibition is the result. These connections are not entirely theoretical—they have been actually demonstrated. He also assumed that the axis cylinder of the pyramidal fiber ends with the terminations around the axis cylinder of the anterior horn cell. The pyramidal fibers have not only an inhibitory influence on the knee-jerk, but their function is in general, not a motor, but an inhibitory one. He would say that voluntary excitation takes place through the cerebellum, and that the direct cortical spinal fibers have only an inhibiting influence. A case of absolute paralysis in connection with degeneration of the pyramidal tract has never been reported. By assuming a

motor pathway, this inhibition would be found very important in finely graduating movements. We know nothing definite about the mode of termination of the fibers around the peripheral neuron. According to the theory just propounded, a complete transverse lesion, interrupting the pyramidal tracts, should cause loss of the knee-jerks. Interruption of the motor cerebellar spinal pathway should cause complete loss of the knee-jerk, for the peripheral stimulus is counteracted by the inhibitory influence of the pyramids. One fact agrees very well with this theory, *viz.*: the degeneration of cortical spinal fibers (pyramidal tracts) frequently associated with degeneration of the anterior horn cells.

DR. C. L. DANA said that Dr. Onuf's theory was very ingenious, but it was open to criticism, which, however, should not be made until after further consideration. The views of Dr. Fraenkel seemed to him very similar to those of Dr. Onuf, and they were certainly very plausible. The chief problem presented was to explain those cases in which the knee-jerks are absent, and yet in which the transverse division of the cord is not complete.

DR. E. D. FISHER asked Dr. Onuf if the pyramidal tracts were no longer to be considered as motor tracts, but rather as simply inhibitory tracts.

DR. ONUF replied that the pyramidal fibers are not the motor tracts in the sense in which we have hitherto considered them. There must be at least this motor pathway, although there might be another one, through the pons, for example. When we stimulate the cortex the fiber which gives the motion is the one which passes into the pons and cerebellum and into the cord.

DR. FISHER asked why, then, with absolute destruction of the cerebellum, as had been done experimentally, we do not get absolute paralysis.

DR. ONUF replied that *all* of the cerebellum had not been extirpated in these experiments. He did not claim that the only motor pathway was through the cerebellum, but that there must be another motor pathway than the pyramidal tract.

DR. C. A. HERTER said that the cases reported by Dr. Fraenkel were very valuable. His experience certainly showed that it was possible to have a complete abolition of the patellar reflex with a partial transverse lesion of the cord above the knee-jerk center. His own impression, gained from clinical observation and from a perusal of the literature, had been that we are justified in regarding a loss of the knee-jerks in consequence of a transverse lesion high up in the cord as an evidence that that transverse lesion is a complete one. He was disposed now to think that we had perhaps been rather hasty in considering this a final conclusion. While he had some hesitancy in throwing aside the theory of the motor function of the pyramidal tract, he believed the theory presented by Dr. Onuf embodied certain valuable suggestions.

DR. JOSEPH COLLINS said that he had been particularly gratified with the paper, because when a few months ago he had ventured the statement before the Society that in cases of incomplete transection of the cord there was sometimes absence of the knee-jerk; it was said in the discussion that this must be an error of observation. The



theory that Dr. Fraenkel had proposed concerning the occurrence of the reflexes presented some anatomic difficulties. While the theory that the fiber conducts impulses in the direction in which it degenerates was no longer tenable, it seemed to him that, as a general rule, it was true. He thought we must assume some influence operating contemporaneously with the cerebellum to explain the reflexes, and possibly some function of the somesthetic area was at work, at least the explanation of "reinforced reflexes" suggested that. This was very much in accordance with the theory promulgated by Dr. Onuf. He did not think any one to-day holds that the motor tracts are absolutely and only motor. The facts of infantile cerebral palsy show that defects of the somesthetic area are not always accompanied by paralysis, if we were not in possession of much evidence of the same kind from other sources.

DR. STARR queried if it would militate against Onuf's theory if it were considered that the pyramidal tracts are developed in animal life exactly in accordance with the development of the digital extremities. Dr. Spitzka has shown that in the seal, walrus, and elephant, the pyramidal tract is practically wanting, and develops in accordance with the motility of the digits. This fact was interesting in connection with Onuf's theory.

THE PRESIDENT said that in spite of all the facts brought out the cases under consideration were, after all, exceptional. Granting that in the complete lesion of the cord above the lumbar level the knee-jerks are abolished, there have certainly been a number of other cases in which, although the lesion was tolerably complete, the functions were not entirely lost. In Pott's paralysis it is a common thing for the knee-jerks to be exaggerated. He had had an autopsy in a case of dorsal Pott's disease in which the cord was completely softened, yet the knee-jerks instead of being lost were exaggerated from beginning to end, and there were also contractures. For these reasons it did not seem to him wise to build up theories to explain exceptional cases. We would all be compelled to abandon the theory that the pyramidal tract conducts motion only, or chiefly. There is a fair foundation for the view that there is one corticospinal tract, and one cerebellar tract. After an examination of a large number of cases of spastic palsies, in both adults and children, he had found very few cases in which there was no paralysis. He felt positive that these cases had more paralysis than spasticity or rigidity.

DR. ONUF said that the pyramidal tracts have been found to be absolutely absent throughout the whole cord in a fetus of seven or eight months. This fact has been quoted to explain those cases of Little's disease in which there is no cerebral disease, and no paralysis, but only rigidity. It also tends to confirm the view that the pyramidal tracts are not strictly motor pathways.

DR. FRAENKEL, in closing, said that he did not doubt that any supralumbar disease of the cord will produce spastic paraplegia, but when there is a mechanical and pathologic condition interfering progressively with the conducting function of the cord, and sufficient to give motor paralysis, the knee-jerks will be lost. Where there is

a total anatomic destruction of the cord, the reflexes are abolished, probably because of the cutting off of the cerebellar influence passing through the columns of Gowers. In a few of the recorded cases there was only partial destruction, yet the knee-jerks were lost as soon as the deep sensibility fibers were destroyed.

#### NOTES ON SOME ANATOMIC CHANGES IN THE BRAIN-CELLS IN ACUTE ALCOHOLISM.

DR. CHARLES L. DANA, read a brief paper with this title, reporting ten cases, and the results of his studies in this direction during the past two years. He had used Nissl's stain for the most part. He stated that what was ordinarily known as acute alcoholic meningitis could not be said to be a meningitis at all, although clinically these patients died with all the symptoms of meningitis. The autopsy reveals simple congestion and edema of the brain, and even the microscope but rarely shows any migration of leucocytes or anything approaching encephalitis. In some cases, not even vascular activity will be observed. Alcoholic meningitis is not primarily a vascular disorder, but a slow poisoning; hence, we must study the cell to determine the changes produced. It has been stated by some investigators that all forms of cell degeneration are the same, and that it is impossible, as Nissl claimed, to make out different cell degenerations in accordance with the particular pathologic irritant. Whether this is so, or not, certainly the microscopic appearances are different in different cases of alcoholic meningitis, and in other cases associated with delirium and acute disorder prior to death. There is one type of degeneration quite characteristic of those dying from sunstroke, with intense delirium and very high fever. It consists in a distinct and general pigmentation, involving the larger cells. This sudden development of pigmentary degeneration would seem to be characteristic of acute febrile degeneration, associated with acute toxemia. Another kind of pigmentary cell degeneration was found in a case of pernicious anemia. Here, the pigmentation involved both the small and large cells. In a case of prolonged use of morphin and whisky, in which death was due to exhaustion and malnutrition, the brain showed quite a general atrophy of both the nuclei and the cell bodies. There are three types of cell degeneration, *viz.*: (1) Intense pigmentation of the larger cells, chiefly with degeneration of the cytoplasm; (2) a general cell atrophy of the body and nucleus; and (3) a good deal of change in the cell-body, with many neuroglia nuclei in the pericellular spaces. In the cases of alcoholism and alcoholic meningitis it was not possible to make out a distinct type of cell degeneration, nor could this be expected, as these patients die not so much from the alcohol as from autotoxemias, and from the febrile process.

#### A CASE OF MENINGITIS SEROSA ACUTA.

Drs. C. A. HERTER and IRA VAN GIESON reported a case apparently coming in this category. The patient was a man, thirty-three years of age, who had enjoyed good health up to a year before his admission to the hospital. While in the hospital he suddenly developed coarse clonic spasms. The feet were habitually in extension, and there was slight clonic spasm in the flexors of the thigh. There

was extreme and constant deviation of the head and eyes to the right. The spasms in the arms and legs were fairly symmetrical. The pupils were equal, of moderate size, and reacted fairly to light. The pulse was slow, of high tension, and fairly regular; the respirations were stertorous. On the following day the right arm was rigid, and the left relaxed, and the coarse flexor spasm had disappeared. Then a hemiplegia developed on the left side; the pulse was rapid, feeble, and of low tension. Toward the close of the day the patient could be aroused to partial consciousness. On the third day the irregular coarse spasms of the muscles began again, and were most marked at this time on the left side instead of on the right. The right pupil was dilated. On the fourth day the condition was essentially the same, but toward evening the irritative symptoms were less marked. On the fifth day, all spasmodic movements ceased, and the patient remained comatose until death occurred. The temperature had been only moderately elevated. The autopsy was made by Dr. Van Gieson. He found over the entire frontal and central lobes a thick layer of fluid between the pia and the surface of the brain. The pia was milky, thickened, and opaque. In the occipital and temporal regions this membrane was quite normal. The fluid was most abundant in the frontal region, but was nearly uniformly distributed over the whole center. The vessels and pia mater of the base were normal. The substance of the brain was pale, and the convolutions only slightly flattened. Microscopic examination showed the vessels of the pia to be largely obliterated. This effusion appeared to have occurred at the time of the onset of the acute symptoms. Probably the hemiplegia was due to pressure on the cortex. A similar case had been reported in which the effusion had apparently been due to an infection.

DR. DANA said that he had seen quite a number of cases of alcoholism presenting an almost identical pathologic condition, although such a serious condition of the brain was not the rule in alcoholism. The clinical symptoms, however, did not permit of a differential diagnosis, nor did they indicate a sudden effusion.

DR. STARR said that in operations on the brain, a varying amount of fluid would be found under the pia, irrespective of the lesion present. Slight manipulation of the brain by the surgeon would cause a disappearance of this fluid. For this reason he did not think much stress should be laid upon similar pathologic findings.

#### HEMORRHAGE INTO THE LATERAL VENTRICLES OF A NEWLY BORN INFANT.

DR. HERTER presented a specimen illustrating this condition. The child had been born at six months, and had lived in an incubator for a week. Labor had been difficult, but without forceps. A day or two before death extreme flexion of the toes and right index finger had been noted together with a general and marked icterus. The autopsy showed nothing abnormal except in the brain. In the latter was a hemorrhage which accurately filled both ventricles.

THE PRESIDENT remarked that hemorrhage into the brain had been reported as having occurred at some period of fetal life.

## REVIEWS.

### REFERENCE-BOOK OF PRACTICAL THERAPEUTICS.

By various authors. Edited by FRANK P. FOSTER, M.D. Two volumes. New York: D. Appleton & Co., 1896.

THIS is one of the most practical books on therapeutics that has appeared in recent years. It is especially designed for practising physicians, devoting its chief attention to therapeutics, and only regarding the physical properties of drugs in so far as these may have more than a pharmaceutical interest. Thus, the busy practitioner is saved a good deal of time, by not being compelled to wade through a mass of, to him, unimportant data connected with the physical properties and minerologic and botanic relations of the various drugs.

The authors who have assisted in this work are for the most part teachers of therapeutics in the various institutions of the country, and are specially noted for inculcating the facts that nihilism in therapeutics is inimical to medical progress, and is unscientific.

The various remedies treated are arranged in alphabetical order, making this work one in which reference is easy.

Some of the articles are more elaborately treated than others, and not always commensurate with their importance. As a rule, however, much-used therapeutic remedies receive the most attention at the hands of the various authors.

The reviewer may justly say that this work will be of very valuable assistance to every practising physician who employs it, for it embodies all the recent discoveries in practical and physiologic therapeutics; gives the most important therapeutic features and indications for the use of the various remedial agents, and this in a form so readily accessible that it is worth, in the saving of time, more than the cost of the book.

It is almost needless to say anything about the typographic features or the binding. The name of the publishers is its best recommendation in this regard.

SKIASCOPY AND ITS PRACTICAL APPLICATION TO THE STUDY OF REFRACTION. BY EDWARD JACKSON, A.M., M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic, etc. Second edition. Philadelphia: The Edwards & Docker Co., 1896.

THE appearance of a second edition of this excellent manual shows that more general interest is being taken in the practical application of the shadow-test to the determination of ametropia, as well as in the theoretical study of the procedure. The advantage of skiascopy, its objectivity, accuracy, and rapidity have long been recognized. The lack of a good handbook was, however, an important factor in preventing its general adoption. Jackson's work, while concise and clear, is based on scientific principles, and shows the practical grasp of the subject due to experience with its working methods. The use of both the plane and the concave mirror is explained with reference to graphic representations in each case.

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Medical Letters may be addressed to

Mr. FELLOWS, 48 Vesey Street, New York.